

**Wolf  
Management Report  
of survey-inventory activities  
Federal Aid in Wildlife Restoration  
1 July 1996–30 June 1999**

**Mary U. Hicks, Editor  
Alaska Department of Fish and Game  
Division of Wildlife Conservation  
December 2000**

Please note that population and harvest data in this report are estimates and may be refined at a later date.

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**Mary Hicks  
Publications Specialist  
ADF&G, Wildlife Conservation  
P.O. Box 25526  
Juneau, AK 99802  
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## **LOCATION**

**GAME MANAGEMENT UNIT:** 1A (5300 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Unit 1 south of Lemesurier Point, including all drainages into Behm Canal and excluding all drainages into Ernest Sound

## **BACKGROUND**

Wolves live throughout the islands and mainland of Unit 1A, although densities on the mainland are generally lower than on maritime-influenced offshore islands. Wolves are capable swimmers and regularly travel between adjacent islands in search of prey.

Wolves feed primary on deer in southern Southeast Alaska, particularly on islands in the area. On the mainland, where deer densities are generally lower than on islands, wolves primarily prey on mountain goats and moose. Marine mammals, salmon, waterfowl, and small mammals supplement the diets of wolves in the area.

The coloration of Southeast Alaska wolf pelts varies; however, the brown/gray color phase is most common. During the past decade, white or near-white pelts have comprised less than 1% of the harvest while black pelts have accounted for about 20% of the Unit 1A harvest.

From 1915 through the early 1970s, cash bounty was paid for wolves taken in the region and in the 1950s Federal agents poisoned wolves on many Southeast islands in an effort to increase or maintain deer numbers. None of these programs had long-lasting effects on wolf abundance or distribution. However, in 1990 Southeast Alaska wolves, named by some taxonomists as the Alexander Archipelago wolf, were identified by a USDA Forest Service-sponsored interagency committee as a species for which there were concerns about viability or distribution as a result of extensive timber harvesting in the Tongass National Forest. In 1993 the Biodiversity Legal Foundation (Boulder, CO) and an independent biologist from Haines, Alaska filed a petition with the U. S. Fish and Wildlife Service (FWS) requesting that Southeast Alaska wolves be listed as a threatened subspecies pursuant to the Endangered Species Act. The FWS ruled that listing was not warranted at the time, but indicated that they felt it was clear that without significant changes to the existing Tongass Land Management Plan, the long-term viability of Southeast wolves was seriously imperiled. A comprehensive conservation assessment about was subsequently prepared through the USDA Forest Service (Person et al. 1996). The most important consideration identified in the assessment was the need to maintain long-term carrying capacity for deer, the principal prey for most of the wolf population. The authors suggested that a series of old-growth forest reserves might provide an effective strategy to increase the likelihood that wolves will persist where extensive timber harvesting has occurred or is planned.

## **MANAGEMENT OBJECTIVES**

Our management objectives are to maintain an average annual harvest of at least 20 wolves from Unit 1A. This level reflects the average harvest for this unit during 1984–1990.

## METHODS

We obtained harvest information through a mandatory-sealing program. The left foreleg must remain attached to the hide until it is sealed for aging purposes. Information obtained from hunters and trappers included the number and sex of harvested wolves, date and location of harvest, method of take, transportation used, and pelt color. We obtained anecdotal information about wolves from hunters and trappers as well as from department staff. Additional information was obtained from trappers through an annual mail-out survey.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

No current population data are available for Unit 1A wolves. Based on the moderate harvest levels reported and low indices of abundance ( $I_A$ ) reported by trappers, wolves in Unit 1A appear to have declined slightly during this report period (Kephart 2000).

#### *Distribution and Movements*

There are currently no wolves with radio transmitters in Unit 1A. Attempts to collar wolves on the Cleveland Peninsula during fall 1999 resulted in 2 males being outfitted with transmitters. Both of those died within one month of capture. Efforts will be made again this coming fall to capture and collar wolves in that area. Anticipated work on Cleveland Peninsula will eventually provide demographic information in an area with less access (fewer roads) and less historical logging activity to compare to data gathered in ongoing research in Unit 2.

### MORTALITY

<u>Season and Bag Limit</u>	<u>Residents and Nonresidents</u>	
Hunting:	August 1–April 30	5 wolves
Trapping:	November 10–April 30	no limit

Effective July 1, 1997 the left foreleg must remain attached to the hide until it is sealed.

Hunter/Trapper Harvest. The Unit 1A 1996/97 harvest of 15 wolves was one of the lowest on record. The following year the harvest rebounded to 26, but was still below the seasonal average of 28. Only 7 trappers were successful during the 1996/97 season, which is the lowest number of successful trappers since pelt sealing began in 1985. The low number of successful trappers partly explains the low number of wolves harvested during that season. However, the average catch remained about the same as 1996/97 at 2.1 wolves per trapper. The number of successful trappers was back up during the 1997/98 season, but the catch per trapper was below average at 1.4. On average 15 trappers are successful and each harvest 2 wolves. Eighty percent of the wolves harvested during 1996/97 were trapped while the remainder was shot. Sixty-nine percent of the wolves killed during the 1997/98 season were trapped and the remainder were shot.

Hunter Residency and Success. Local residents regularly account for 94–100% of hunters and trappers pursuing wolves in Unit 1A. Ninety-five percent of the harvest since 1990 has been taken by local residents, followed by nonlocals (3%) and nonresidents (2%). Local residents took all of the 1996/97 harvest and 83% of the 1997/98 harvest.

Harvest Chronology. March has historically seen the peak of the Unit 1A wolf harvest followed by February. In the past 2 years the harvest was spread out more evenly over the open season with slightly more taken during December and March.

Transport Methods. Boats and highway vehicles continue to account for the majority of transport methods used by Unit 1A wolf hunters and trappers. During this report period the majority of trappers used boats (95%) and the remainder used highway vehicles.

#### *Other Mortality*

Mortality from natural causes (starvation, accidents, disease, fighting) in exploited populations is low, typically averaging 5 to 10% per year (Fuller 1989). One male wolf was killed by a car on South Tongass Highway during early fall 1998. This male had an old wound on one front leg, and consequently the animal was in poor physical condition. Four wolves have reportedly been killed on the highway by cars since 1985.

## CONCLUSIONS AND RECOMMENDATIONS

We believe Unit 1A wolf numbers have slightly declined during this report period. Trapping effort has also declined, although the catch per successful trapper has remained similar to the preceding 10-year average.

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**PREPARED BY:**

Boyd Porter  
Wildlife Biologist II

**SUBMITTED BY:**

Bruce Dinneford  
Management Coordinator

Table 1 Unit 1A wolf harvests, 1985–1998

Season	Males	Females	Unk	Total	Method of take			Pelt color			
					Shot	Trapped	Unk	White	Grey	Black	Unk
1985/86	6	5	0	11	1	10	0	0	7	4	0
1986/87	11	10	0	21	3	18	0	0	16	5	0
1987/88	14	9	0	23	9	14	0	0	16	7	0
1988/89	13	8	0	21	10	11	0	0	14	7	0
1989/90	12	19	2	33 <sup>a</sup>	14	19	0	0	25	8	0
1990/91	9	6	0	15	9	6	0	0	11	4	0
1991/92	15	16	0	31	12	19	0	0	29	2	0
1992/93	26	16	0	42	11	31	0	0	36	6	0
1993/94	18	14	0	32	6	26	0	0	24	7	1
1994/95	22	18	0	40	11	29	0	1	35	4	0
1995/96	24	25	0	49 <sup>b</sup>	17	29	3	0	38	11	0
1996/97	5	10	0	15	3	12	0	0	12	3	0
1997/98	13	13	0	26 <sup>c</sup>	8	18	0	0	21	5	0
Totals	188	169	2	359	114	242	3	1	284	73	1

<sup>a</sup> Does not include 1 gray female killed by a car on South Tongass Highway, Ketchikan.

<sup>b</sup> Does not include 2 gray males killed by cars on North Tongass Highway and White River Road, Ketchikan.

<sup>c</sup> Does not include 1 gray male killed by a car on South Tongass Highway, Ketchikan.

Table 2 Unit 1A wolf hunter/trapper transport methods, 1985–1998

Season	Air	Boat	Highway		Unknown
			vehicle	Walked	
1985/86	0	5	3	0	3
1986/87	10	11	0	0	0
1987/88	0	21	2	0	0
1988/89	0	16	5	0	0
1989/90	2	26	5	0	0
1990/91	1	10	2	0	2
1991/92	1	24	1	5	0
1992/93	2	30	3	3	4
1993/94	1	28	2	0	1
1994/95	1	32	6	1	0
1995/96	1	33	12	2	1
1996/97	0	15	0	0	0
1997/98	0	24	2	0	0
Totals	19	275	43	11	11



Table 3 Unit 1A wolf harvest chronology by month, 1985–1998

Season	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
1985/86	0	0	0	0	0	1	4	3	2	1	0	0
1986/87	0	1	0	0	1	2	3	11	2	1	0	0
1987/88	0	0	1	1	0	4	6	3	1	1	3	3
1988/89	0	1	2	1	3	2	4	0	3	4	1	0
1989/90	0	1	1	4	4	5	3	3	6	5	1	0
1990/91	0	0	2	1	4	0	2	2	0	2	2	0
1991/92 <sup>a</sup>	0	0	0	4	3	2	2	4	9	6	1	0
1992/93	0	1	1	2	5	6	1	4	15	7	0	0
1993/94	0	2	0	0	0	3	6	5	13	2	1	0
1994/95	0	0	2	6	1	1	2	16	6	6	0	0
1995/96	0	2	3	2	6	5	4	8	12	6	1	0
1996/97	0	0	0	3	0	1	4	1	3	3	0	0
1997/98	0	1	0	4	0	6	3	4	6	2	0	0
Totals	0	9	12	28	27	38	44	64	78	46	10	3

<sup>a</sup> Hunting season changed from year round, no limit, to August 1–April 30, 5 wolf limit.

Table 4 Number of hunters/trappers who killed Unit 1A wolves, and average catch per trapper, 1985–1998

Season	Number of trappers harvesting wolves	Average catch/person
1985/86	7	1.6
1986/87	10	2.1
1987/88	12	1.9
1988/89	15	1.4
1989/90	18	1.8
1990/91	13	1.1
1991/92	17	1.8
1992/93	19	2.2
1993/94	15	2.1
1994/95	17	2.3
1995/96	25	2.0
1996/97	7	2.1
1997/98	18	1.4

Table 5 Residency of Unit 1A wolf trappers/hunters, 1990–1998

Season	Local resident <sup>a</sup>	Nonlocal resident <sup>b</sup>	Nonresident
1990/91	13	0	0
1991/92	16	1	0
1992/93	19	0	0
1993/94	15	0	0
1994/95	15	1	1
1995/96	25	0	0
1996/97	7	0	0
1997/98	15	2	1
Totals	125	4	2

<sup>a</sup> Local residents are those individuals living within the boundaries of Unit 1A.

<sup>b</sup> Nonlocal residents are Alaska residents living somewhere outside Unit 1A.

## **LOCATION**

**GAME MANAGEMENT UNIT:** Unit 1B (3000 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** The Southeast Mainland from Cape Fanshaw to Lemesurier Point

## **BACKGROUND**

Wolves inhabit the mainland of Unit 1B, where they immigrated following post-glacial immigration and establishment of deer populations. Deer are the primary food source for wolves in Southeast Alaska, with moose and mountain goat being important in some mainland areas.

Wolf densities are higher in Unit 1B than in interior regions of Alaska, but due to dense forest cover viewing opportunities are infrequent.

Government wolf control programs and bounties were maintained into the 1970's in an effort to increase deer numbers. Today a few recreational trappers and opportunistic sport hunters harvest wolves in the subunit.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

Maintain a viable wolf population in all areas of historic range.

## **METHODS**

We monitored the wolf harvest through a mandatory pelt-sealing program. We collected data on the number of wolves killed, sex, date of take, method of take, method of transportation used from home to the field, and the estimated number of wolves associated with the ones killed. The left foreleg was collected from each sealed wolf to determine relative age, beginning in 1997-98.

We recorded observations of wolves made by Forest Service biologists, trappers, hunters, and other members of the public. An annual statewide trapper survey supplied additional information.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

We did not collect sufficient data to make a meaningful estimate of wolf populations. Conversations with trappers, hunters, pilots, and other biologists and information from trapper questionnaires indicated the wolf population increased in the 1990s.

### **MORTALITY**

#### *Harvest*

<u>Season and Bag Limit</u>	<u>Residents and Nonresidents</u>	
Trapping:	November 10–April 30	No limit
Hunting:	August 1–April 30	5 wolves

Board of Game Actions and Emergency Orders. There was no Board of Game action or emergency orders issued during this report period.

Hunter/Trapper Harvest. Unit 1B witnessed 4, 9, and 13 wolves taken by 4, 4, and 6 individuals in 1996/97, 1997/98, and 1998/99, respectively (Table 1). In 1997/98, 33% of harvested wolves were adults, and in 1998/99 55% were adults (Table2). Wolves were not aged in 1996/97. Trapping continues to be the primary method of take. Deer hunters, and occasionally moose hunters, are generally responsible for shot wolves.

Most of the wolf harvest takes place in close proximity to local communities. Much of the mainland is not trapped.

Harvest Chronology. In the 1996/97 season, August, September, January, and February each accounted for an equal percentage of the harvest (Table 3). In 1997/98, December, January, and February accounted for the highest percent of the harvest. In 1998/99, August, December, and January accounted for the highest percentage of the harvest. Wolves harvested in August and September are taken incidentally to other hunting activities.

Transport Methods. Trappers using small boats in 1996/97, 1997/98, and 1998/99 (Table 4) harvested all wolves. Other forms of transportation are rarely used.

## CONCLUSIONS AND RECOMMENDATIONS

The wolf harvest remains low in Unit 1B and much of the unit is not trapped. I recommend no change in regulations.

### PREPARED BY:

Edward B. Crain  
Wildlife Biologist III

### SUBMITTED BY:

Bruce Dinneford  
Management Coordinator

Table 1 Unit 1B wolf harvest, 1988–98

Regulatory year	Reported harvest				Method of take			Successful trappers/hunters
	M	F	Unk.	Total	Trap/Snare	Shot	Unk.	
1988/89	4	5		9	6	3		6
1989/90	12	7		19	14	5		8
1990/91	7	8		15	10	5		3
1991/92	4	6		10	7	3		7
1992/93	3	5		8	7	1		2
1993/94	9	8		17	11	6		9
1994/95	11	5		16	14	2		8
1995/96	1	3		4	3	1		4
1996/97	2	2		4	2	2		4
1997/98	5	4		9	9	0		4
1998/99	6	7		13	8	5		6

Table 2 Age of harvested Unit 1B wolves<sup>1</sup>, 1997–98

Regulatory year	Adults	Subadults <sup>2</sup>	% adults
1997/98	2	4	33
1998/99	6	5	55

<sup>1</sup> Not all harvested wolves were aged.

<sup>2</sup> Less than 1 year of age.

Table 3 Unit 1B wolf harvest chronology, by percent by month, 1988–98

Regulatory year	Harvest periods												n
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	
1988/89		11		11	11	56	11						9
1989/90			11	11	16	32	26			15			19
1990/91				13		7	40	13	26				15
1991/92		10			10	20	60						10
1992/93					12	50	26			12			8
1993/94		6		6	17	36	12	17		6			17
1994/95		6			6	57	19	6	6				16
1995/96					25	25		25	25				4
1996/97		25	25				25	25					4
1997/98						33	11	56					9
1998/99		15	8		8	23	38	8					13

Table 4 Unit 1B wolf harvest, by percent by transport method, 1988–98

Regulatory year	Percent of harvest					<i>n</i>
	Airplane	Boat	3- 4-wheeler	Snowmachine	Other	
1988/89	11	78		11		9
1989/90		89		11		19
1990/91		73	7	13	7	15
1991/92		90		10		10
1992/93		100				8
1993/94	6	88		6		17
1994/95	6	94				16
1995/96		100				4
1996/97		100				4
1997/98		100				9
1998/99		100				13





## **LOCATION**

**GAME MANAGEMENT UNIT:** 1C (6500 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** That portion of the southeast Alaska mainland from Cape Fanshaw to the latitude of Eldred Rock

## **BACKGROUND**

Wolves are distributed throughout the mainland portion of Unit 1C, but anecdotal evidence suggests they primarily inhabit major mainland river drainages. An exception is in the Chilkat Mountains and the Gustavus Forelands where wolves appear to be uniformly distributed, probably in part due to the distribution of moose. During the report period we received reports of packs in the Gustavus Forelands, Endicott River, St. James Bay, Point Couverden, Berners Bay, Nugget Creek, Taku River, Snettisham, and Endicott Arm areas. Several people reported seeing wolves on Douglas Island, but none of these reports were substantiated. There is no evidence that wolves exist on Shelter, Lincoln, or Sullivan Islands.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

No formal wolf management goals have been established for this unit, however our general management objectives are to regulate seasons and bag limits to maintain populations of wolves for viewing and harvest. Our management strategy is to maintain wolf harvests at a level similar to the mean for the previous 5 seasons. No wolf control is contemplated for this area at this time.

## **METHODS**

Through mandatory sealing of wolf hides taken by successful hunters and trappers we collected the following data: date and method of take, sex, transportation mode, and number of animals in the pack the wolf was harvested from. We also required hunters and trappers to leave the lower front leg bone attached to the hide for sealing. We used this bone to separate wolves into 3 age categories, juveniles (less than 1 year of age), yearlings, and adults. The population was monitored by whatever means were available including anecdotal reports, aerial survey sightings, discussions with hunters and trappers, and information collected from the annual statewide trapper surveys.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

We did not collect sufficient data to make meaningful estimates of wolf populations within the unit. Although no quantitative data is available, anecdotal reports and discussions with local hunters, trappers, and pilots as well as harvest data suggest wolf numbers are stable or slowly

increasing. Wolves appear to be increasing near Gustavus and the Chilkat Range where moose are becoming more abundant.

## **MORTALITY**

### *Harvest*

#### Seasons and Bag Limits

Hunting:	August 1–April 30	5 Wolves
Trapping:	November 10–April 30	No Limit

Board of Game Actions and Emergency Orders. There were no Board of Game actions or Emergency Orders issued during the report period.

Hunter/Trapper Harvest. Eight wolves (5 males, 3 females) were harvested in 1996 (Table 1), 4 from the Chilkat Mountains, 3 from the Gustavus area, and one from Cape Fanshaw. This is higher than the previous 5-year mean of 5.8 (range = 5–7). In 1997, 9 wolves (6 males, 3 females) were harvested, 7 from the Chilkat Mountains, 1 from the Taku River valley, and 1 from Hobart Bay. This was again higher than the 5-year mean of 6.6 (range = 5–9). In 1998, 4 wolves (1 male, 2 females, and 1 of unknown sex) were harvested, 3 from the Chilkat Mountains, and one from the Gustavus area. This was lower than the 5-year mean of 7.2.

The combined harvest for 1996–1998 was 21 wolves, comprising 19 (90%) taken in snares and 2 (10%) taken with firearms. The color of these wolves ranged from black to gray, with 7 gray wolves, 11 black, and 3 of unknown color.

Hunter/Trapper Residency and Success. In 1996, 2 residents of the unit harvested 7 of 8 wolves that were taken. This trend continued in 1997 and 1998 when 3 and 2 local residents respectively accounted for the entire harvest.

Harvest Chronology. Trapping harvest is spread throughout the season, with the exception of summer months, and is not consistent from year to year (Table 2). Most recent harvest has occurred from January to March.

Transport Methods. Boats were the primary access for wolf hunters and trappers, although airplanes and highway vehicles were also used (Table 3).

### *Other Mortality*

No natural mortality was documented during the report period.

## **CONCLUSIONS AND RECOMMENDATIONS**

Little is known about wolf populations within Unit 1C. Reports from people afield and incidental observations by Department of Fish and Game staff indicate that wolves are common in some areas and may be more plentiful than we previously thought near Gustavus. Mountain goats and moose are the most common big game prey species in the area, and the effect of wolves upon

these populations may be considerable. Low deer densities on the mainland portions of the unit are likely due in part to wolf predation.

Wolf harvests are stable but low. Little effort is exerted towards taking wolves in this unit, and the harvest remains well below the level that would exert significant pressure on the population. No changes in seasons or bag limits are recommended at this time.

**PREPARED BY:**

Neil L. Barten  
Wildlife Biologist III

**SUBMITTED BY:**

Bruce Dinneford  
Management Coordinator

Table 1 Unit 1C wolf harvest chronology, 1988–1998

Regulatory year	Males	Females	Unknown	Total
1988	3	2	0	5
1989	4	7	1	12
1990	4	2	0	6
1991	1	4	0	5
1992	3	2	0	5
1993	3	4	0	7
1994	4	1	2	7
1995	2	3	0	5
1996	5	3	0	8
1997	6	3	0	9
1998	1	2	1	4

Table 2 Unit 1C wolf harvest chronology by month, 1988–1998

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1988									5			
1989				1	1	5	3	1		1		
1990			1			3				1	1	
1991			2							2	1	
1992					1		1		2	1		
1993							2	3	1	1		
1994			2	2		1		1	1			
1995		1		1		2			1			
1996					1		3	3	1			
1997			1				6	1	1			
1998								3		1		

Table 3 Unit 1C wolf harvest percent by transport method, 1988–1998

Regulatory year	Airplane	Dogsled, skis, snowshoes	Boat	3- or 4- wheeler	Snow- machine	ORV	Hwy vehicle	Unknown
1988			50		50			
1989			84		8		8	
1990			83				17	
1991	40		60					
1992			80				20	
1993			100					
1994		14	86					
1995			20			40	40	
1996	44		56					
1997	100							
1998	75						25	

## LOCATION

**GAME MANAGEMENT UNIT:** 1D (2700 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** That portion of the southeast Alaska mainland lying north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay

## BACKGROUND

We have not conducted wolf investigations in this unit, and population information is based upon anecdotal information, sightings made during aerial moose surveys, and discussions with hunters and trappers. This subunit differs from many other areas in southeast Alaska in that deer are nearly absent and are not an important prey source for wolves. The major prey species are moose, mountain goats, and beaver. The beaver population is increasing and probably represents a much greater portion of the wolves' diet than in the past.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

No formal management goals have been established for wolves in this unit, however, our general management objectives are to regulate seasons and bag limits to maintain populations of wolves for viewing and harvest. Our management strategy is to maintain wolf harvests at a level similar to the mean over the previous 5 seasons. No wolf control methods are planned for this area at this time.

## METHODS

Through the mandatory sealing of wolves taken by successful hunters and trappers we collected the following data: date and method of take, sex, transportation mode, and number of animals in the pack the wolf was taken from. We also required hunters and trappers to leave the lower front leg bone attached to the hide for sealing. We used this bone to separate wolves into 3 age categories; juveniles (less than 1 year of age), yearlings, and adults. The population was monitored by whatever means were available, including anecdotal reports, aerial survey sightings, discussions with trappers and hunters, and information collected from the annual statewide trapper survey. Alaska Department of Fish & Game and Fish and Wildlife Protection staff sealed wolves in Haines.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

We did not collect sufficient data to make meaningful estimates of wolf populations within the unit. Although no quantitative data is available, anecdotal reports and discussions with local hunters, trappers, and pilots suggest wolf numbers are stable.

## MORTALITY

### *Harvest*

#### Seasons and Bag Limits

Hunting:	August 1–April 30	5 Wolves
Trapping:	November 10–April 30	No Limit

Board of Game Actions and Emergency Orders. No Board of Game actions or emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. During the 1996 regulatory year 8 wolves (4 males, 4 females) were harvested by local residents of Unit 1D (Table 1). Five of these were taken along the Chilkat River. In 1997, 3 wolves (1 male, 2 females) were taken, and the 1998 harvest was 4 wolves (1 male, 2 females, and 1 of unknown sex).

As in past years, hunters harvested more wolves than trappers did during the report period. The combined harvest for 1996–1998 was 15 wolves, comprising 13 (87%) harvested with firearms and 2 (13%) harvested with traps. This is partly due to the ease with which hunters detect wolves on the Chilkat River flats. The color of these wolves was 2 white, 6 gray, and 7 black.

Harvest Chronology. There was no pattern to the harvest timing during the report period (Table 2), and numbers are so low that one individual could change the harvest pattern by taking a few wolves at a different time.

Transport Methods. Access methods used by trappers and hunters who took wolves during the report period show little consistency year to year (Table 3). Because the harvest is small and few hunters and trappers are represented in more than a single year, inconsistency is not surprising. Again, 1 or 2 individuals focusing on hunting or trapping in the subunit could dominate the harvest data.

### *Other Mortality*

No natural mortality was documented during the report period.

## CONCLUSIONS AND RECOMMENDATIONS

The current status of the Unit 1D wolf population is uncertain. Little effort is made to take wolves in the area, but with lower moose numbers than in the past in the Chilkat Valley, any noticeable predation raises public concern. Balanced against this are the nonconsumptive values that wolves may offer ecotourism operations. Wolf management planning in 1991 and 1992 showed most local respondents preferred no wolf control and some even recommended no harvest of wolves be allowed. No changes in seasons or bag limits are recommended at this time.

### PREPARED BY:

Neil L. Barten  
Wildlife Biologist III

### SUBMITTED BY:

Bruce Dinneford  
Management Coordinator



Table 1 Unit 1D wolf harvest chronology, 1988–1998

Regulatory				
year	Males	Females	Unknown	Total
1988	0	1	0	1
1989	3	1	1	5
1990	0	1	0	1
1991	0	0	0	0
1992	0	3	0	3
1993	1	0	0	1
1994	1	1	0	2
1995	1	2	0	3
1996	4	4	0	8
1997	3	0	0	3
1998	1	2	1	4

Table 2 Unit 1D wolf harvest chronology, 1988–1998

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1988						1						
1989				3		1			1			
1990					1							
1991												
1992						1	2					
1993				1								
1994					1				1			
1995				1					1	1		
1996			2				2			4		
1997				1	1		1					
1998						2	1		1			

Table 3 Unit 1D wolf harvest percent by transport method, 1988–1998

Regulatory year	Airplane	Dogsled, skis, & snowshoes	Boat	3- or 4- wheeler	Snow- machine	ORV	Highway vehicle	Unknown
1988			100					
1989				20	20		60	
1990							100	
1991								
1992	67						33	
1993			100					
1994							100	
1995					33		33	33
1996			43		14		43	
1997		25	25				50	
1998		25			25		50	

## LOCATION

**GAME MANAGEMENT UNIT:** 2 (3600 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Prince of Wales and adjacent islands south of Sumner Strait and west of Kashevarof Passage

## BACKGROUND

Wolves live throughout the islands of Unit 2, and densities on Prince of Wales and the surrounding maritime-influenced offshore islands are generally higher than on the nearby Unit 1A mainland. Wolves are capable swimmers and regularly travel between adjacent islands in search of prey. Movements between Unit 2 and the mainland are likely much less frequent.

Wolves feed primarily on deer in southern Southeast Alaska, particularly on islands in the area. Unit 2 wolves depend on deer for the majority of their diet. Black bears are also occasionally killed by wolves, but probably provide a small portion of their diet. Marine mammals, salmon, waterfowl, and small mammals supplement the diets of wolves in the area.

The coloration of Southeast Alaska wolf pelts varies; however, the brown/gray color phase is most common. During the past decade, white or near-white pelts have comprised less than 1% of the harvest while black pelts have accounted for about 14% of the Unit 2 harvest.

From 1915 through the early 1970s, a cash bounty was paid for wolves taken in Southeast Alaska, and in the 1950s Federal agents poisoned wolves on many Southeast islands in an effort to increase or maintain deer numbers. None of these programs had long-lasting effects on wolf abundance or distribution. In 1990, Southeast Alaska wolves (named by some taxonomists as the Alexander Archipelago wolf), were identified by a USDA Forest Service-sponsored interagency committee as a species for which there were concerns about viability or distribution as a result of extensive timber harvesting in the Tongass National Forest. In 1993, the Biodiversity Legal Foundation (Boulder, CO) and an independent biologist from Haines Alaska, filed a petition with the U. S. Fish and Wildlife Service (FWS) requesting that wolves in Southeast Alaska be listed as a threatened subspecies pursuant to the Endangered Species Act. The FWS ruled that listing was not warranted at the time, but indicated that they felt it was clear that without significant changes to the existing Tongass Land Management Plan the long-term viability of the Southeast Alaska wolves was seriously imperiled. A comprehensive conservation assessment about Southeast Alaska wolves was subsequently prepared through the USDA Forest Service (Person et al. 1996). The most important consideration identified in the assessment was the need to maintain long-term carrying capacity for deer, the principal prey for most of the wolf population. The authors suggested that a series of old-growth forest reserves might provide an effective strategy to increase the likelihood that wolves will persist where extensive timber harvesting has occurred or is planned. In 1996 the Board of Game (BOG) recommended a harvest cap of 25% of the annual Unit 2 wolf population estimate. This change went into effect during the 1997/98 hunting and trapping season. In fall 1999 the Unit 2 wolf population was estimated to be about 350 wolves. The harvest guideline was reached during the 1999/00 trapping season and an emergency order was issued closing the remainder of the hunting and trapping season February 29, 1999.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

Our objectives are to maintain an average annual harvest of at least 39 wolves from Unit 2. This level reflects the average harvests for this unit during 1984–1990.

### METHODS

We obtained harvest information through a mandatory sealing program. Throughout Southeast the left foreleg must remain attached to the hide until it is sealed for aging purposes. Information obtained from hunters and trappers included the number and sex of harvested wolves, date and location of harvest, method of take, transportation used, and pelt color. We obtained anecdotal information about wolves from hunters and trappers as well as from department staff. Additional information was obtained from trappers through an annual mail-out survey. We also obtained information from research programs on both Heceta Island and POW looking at predator prey relationships.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

Using a simulation model based on data collected through a graduate research project in Unit 2, Person and Ingle (1995) estimated that 321 wolves (SE = 135) inhabited Prince of Wales and Kosciusko islands during autumn 1994 and 199 wolves (SE = 111) during spring 1995. The smaller spring estimate reflected over-winter mortality, primarily from trapping (Table 1). No current data of a similar nature is available, nor are subsequent estimates available. Consistently high harvests during the past 5 seasons (Table 1) suggest that wolves have remained relatively high in that area as well, although declines in the *indices of abundance* suggest that the population may have declined slightly during the past 3 seasons (Kephart 2000).

Pack sizes on Prince of Wales and Kosciusko islands were larger, averaging 7 to 9 wolves in early autumn before the trapping season (Person and Ingle 1995). All members of wolf packs are rarely observed together, except during winter, and pack sizes are therefore difficult to estimate unless repeated, direct observations are made (Person et al. 1996).

#### *Distribution and Movements*

On Prince of Wales and Kosciusko islands, Person et al. (1996) similarly reported average home ranges of 109 mi<sup>2</sup>. Core areas where wolf activity was concentrated averaged 48 mi<sup>2</sup>, or 55 to 60% smaller than total home ranges.

Pups that survive to adulthood either remain in their natal packs or disperse. In wolf populations where mortality is high, lone wolves may be more successful in finding vacant territories in which to settle or in being accepted into other established packs (Ballard et al. 1987). Dispersing wolves are more vulnerable than non-dispersers to hunting and trapping and are more likely to be killed by other wolves (Peterson et al. 1984).

## MORTALITY

<u>Season and Bag Limit</u>	<u>Resident and Nonresident</u>	
Hunting:	December 1–March 31	5 wolves
Trapping:	December 1–March 31	no limit

Effective July 1, 1997 the left foreleg must remain attached to the hide until it is sealed.

Board of Game Actions and Emergency Orders. During fall 1996 the BOG considered a petition to list the Alexander Archipelago wolf as a threatened subspecies. The BOG recommended that the Unit 2 trapping and hunting season be shortened. Effective July 1, 1997 the hunting and trapping season was changed from August 1 through April 30 to begin December 1 and end March 31. The BOG also imposed a harvest cap of 25% of the estimated fall Unit 2 wolf population. The 1999 fall population in Unit 2 was estimated at about 350 wolves. This estimate was based on population modeling augmented by current radiotelemetry and demographic data. A harvest of 80–90 wolves would represent about 25% of the fall population. A harvest in excess of the guideline was determined to be non-sustainable in the long term and could lead to a population decline.

The 1999/00 season was the first time the harvest ever reached the BOG guideline and the season was closed on February 29 by emergency order. The difference during that particular trapping season was the increase in successful trappers. Historically there have been 3–4 trappers capable of harvesting more than 15 wolves each in Unit 2. This past season there were several new trappers working in Unit 2 with good success.

During the 1998/99 season on Heceta Island there were 4 functioning radios on collared wolves. Three of those continued to produce data, and one (25%) was killed by a trapper. During the 1999/00 season 4 collars were functioning and 3 (75%) have since been killed by trappers. Nine collars were deployed on POW wolves during 1999, and 2 (22%) were subsequently killed by trappers.

Hunter/Trapper Harvest. About 85% of the wolves harvested during the past 2 seasons were caught in traps or snares, while the other 15% were shot (Table 1). The number of people harvesting wolves declined during the past 2 seasons while the average catch per person increased. On average 32 successful trappers took 2.3 wolves each during the season in Unit 2. However, during the 1997/98 season there were only 21 trappers, yet the average catch per trapper (3.8) was the highest since 1985/86 (Table 4).

Hunter Residency and Success. Nonlocal residents have accounted for 34% of the hunters and trappers who took wolves in Unit 2 during the past 10 years. However, despite the high percentage of nonlocals killing wolves in Unit 2, most (63%) wolves harvested are regularly taken by residents of the unit. Only 3% are taken by nonresidents (Table 5).

Harvest Chronology. Wolf harvests are generally affected by local weather conditions. Persistent freezing often makes intertidal sets inoperative and deep snow can bury snares and trail sets

rendering them useless. Typically the Unit 2 harvests have been highest during December and January. However, during the past 2 years the majority of wolves were taken during February (38%).

On average 34% of the harvest has been taken by shooting (both by trappers and hunters) during the past 10 years. Starting in 1997 the opening date for the hunting and trapping seasons was changed from August 1 to December 1, shortening the trapping season by 4 months. The number of wolves taken by shooting was consequently reduced, likely because hunters were not allowed to shoot wolves opportunistically during fall deer hunts.

Transport Methods. Highway vehicles and boats continue to account for the majority of the transport methods used by wolf hunters and trappers in Unit 2. Highway vehicles accounted for 54%, boats 45%, and walking 1% of the transport methods used during the past 2 years (Table 2).

#### *Other Mortality*

In exploited populations, mortality from natural causes (e.g., starvation, accidents, disease, and fighting) is low, typically averaging 5 to 10% per year (Fuller 1989). A more substantial cause of mortality is believed to result from unreported or illegal killing of wolves by people (Person et al. 1996). Of 17 radio-collared wolves on Prince of Wales Island that died during a 3-year study, 53% were legally killed by humans, 29% were killed by humans but not reported, and 18% died from natural causes (Person et al. 1996). Considering the additive effects of natural and unreported mortality, total mortality could be 35 to 50% higher than reported, although some bias may have existed against reporting legally killed wolves with radio collars. Regardless, we believe that reported mortality substantially underestimates total mortality in Unit 2.

### **HABITAT**

#### *Assessment*

As we have reported previously (Wood 1990, Larsen 1991) and as Person et al. (1996) reiterated recently, the expanding road system and increasing human population in Unit 2 will continue to have a direct effect on wolves. We expect long-term reductions in wolf numbers as a direct result of deer declines through habitat loss. As the uneven-aged old growth forest is logged, deer carrying capacity will be reduced, and consequently wolf populations will decline as well. To help mitigate the effects of habitat loss, Person et al. (1996) suggested maintaining large, unfragmented and unroaded blocks of habitat within biogeographic areas where extensive timber harvesting has occurred, or where extensive harvesting is planned. They believe that making Old Growth Reserves large enough to encompass the core activity areas of at least one wolf pack would markedly increase the likelihood of their effectiveness and reduce the long-term risk to wolf viability.

### **CONCLUSIONS AND RECOMMENDATIONS**

We believe that wolf populations have decreased slightly in Unit 2 during this report period. Although we do not consider wolves threatened in southern Southeast Alaska at this time, we have conservation concerns stemming from long-term habitat changes, human population growth, and increased roaded access into once remote wolf habitats. We support the concept of

establishing roadless reserves within logged areas. Current Old Growth Reserves appear to be providing some temporary refugia for wolves. Few wolves have been harvested in the reserves recently due to limited access.

By shortening the trapping season to coincide with the period of maximum pelt primeness (December 1–March 31) we have reduced the annual wolf harvest by an estimated 12%. The new regulation change relieves some concern about harvesting beyond a sustainable level in Unit 2 where habitat changes and increased access are notable.

The Unit 2 wolf harvest approached the BOG established guideline harvest level in winter 2000, and consequently the season was closed by emergency order effective February 29. Suitable weather conditions and an increase in the number of successful trappers resulted in a harvest that may surpass 100 wolves.

Trappers continue to harvest between 22%–75% of collared wolves from ongoing Unit 2 research programs.

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**PREPARED BY:**

Boyd Porter  
Wildlife Biologist II

**SUBMITTED BY:**

Bruce Dinneford  
Management Coordinator

Table 1 Unit 2 wolf harvests, 1985–1998

Season	Males	Females	Unk	Total	Method of take			Pelt color			
					Shot	Trapped	Unk	White	Grey	Black	Unk
1985/86	7	11	0	18	9	9	0	1	14	3	0
1986/87	22	16	1	39	16	23	0	0	32	7	0
1987/88	27	24	4	55	26	29	0	1	39	15	0
1988/89	27	16	2	45	31	14	0	0	41	4	0
1989/90	20	11	1	32	23	8	1	0	20	9	3
1990/91	36	29	1	66	44	21	1	0	50	15	1
1991/92	42	40	4	86	41	45	0	0	80	6	0
1992/93	59	46	0	105	26	79	0	0	93	11	1
1993/94	46	54	3	103	21	81	1	0	80	15	8
1994/95	50	32	3	85	21	64	0	0	82	2	1
1995/96	62	41	0	103	35	68	0	0	90	12	1
1996/97	82	30	0	132	24	108	0	0	118	14	0
1997/98	49	31	0	80	8	72	0	1	66	4	9
Totals	529	381	19	949	325	621	3	3	805	117	24

Table 2 Unit 2 wolf hunter/trapper transport methods, 1985–1998

Season	Air	Boat	Highway vehicle	Walked	Unknown
1985/86	0	4	5	0	9
1986/87	0	14	25	0	0
1987/88	0	31	20	0	4
1988/89	2	25	15	0	3
1989/90	0	12	15	0	5
1990/91	2	15	40	1	8
1991/92	2	53	31	0	0
1992/93	1	68	32	0	4
1993/94	1	59	42	0	1
1994/95	1	57	25	2	0
1995/96	3	60	39	0	1
1996/97	0	44	86	1	1
1997/98	0	51	29	0	0
Totals	12	493	404	4	36

Table 3 Unit 2 wolf harvest chronology, 1985–1998

Season	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
1985/86	0	0	4	1	2	2	3	4	1	1	0	0
1986/87	0	1	1	1	2	11	6	9	5	2	1	0
1987/88	0	1	1	7	7	11	3	11	8	1	4	1
1988/89	0	0	5	8	5	8	5	4	0	3	4	3
1989/90	0	2	3	3	2	5	3	2	2	2	4	4
1990/91	0	4	4	8	7	6	7	12	12	6	0	0
1991/92	1	2	7	1	8	20	18	7	7	11	2	2
1992/93 <sup>a</sup>	0	1	3	8	10	19	15	16	28	4	1	0
1993/94	0	1	2	6	11	24	33	16	8	2	0	0
1994/95	0	1	2	4	4	22	18	19	12	3	0	0
1995/96	0	2	8	8	1	15	22	19	27	1	0	0
1996/97 <sup>b</sup>	0	3	7	7	2	12	26	51	21	3	0	0
1997/98	0	0	0	0	0	20	27	30	3	0	0	0
Totals	1	18	47	62	61	175	186	200	134	39	16	10

<sup>a</sup> Hunting season changed from year round, no limit, to August 1–April 30, 5 wolf limit.

<sup>b</sup> Hunting and trapping seasons changed from August 1–April 30 to December 1–March 31.

Table 4 Numbers of trappers who caught wolves in Unit 2, and average catch per trapper, 1985–1998

Season	Number of trappers that harvested wolves	Average catch/trapper
1985/86	14	1.3
1986/87	27	1.4
1987/88	34	1.6
1988/89	31	1.4
1989/90	28	1.1
1990/91	42	1.6
1991/92	37	2.3
1992/93	35	3.0
1993/94	30	3.4
1994/95	37	2.3
1995/96	38	2.7
1996/97	36	3.7
1997/98	21	3.8

Table 5 Residency of Unit 2 wolf trappers/hunters, 1990–1998

Season	Local resident <sup>a</sup>	Nonlocal resident <sup>b</sup>	Nonresident
1990/91	24	18	0
1991/92	19	15	3
1992/93	18	16	1
1993/94	24	6	0
1994/95	24	11	2
1995/96	18	20	0
1996/97	30	5	1
1997/98	18	3	0
Totals	175	94	7

<sup>a</sup> Local residents are those individuals living within the boundaries of Unit 2.

<sup>b</sup> Nonlocal residents are Alaska residents living somewhere outside Unit 2.

## LOCATION

**GAME MANAGEMENT UNIT:** Unit 3 (3,000 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Islands of the Petersburg, Wrangell, and Kake area

## BACKGROUND

Wolves have inhabited Unit 3 islands since the postglacial immigration and establishment of deer populations. Deer are the primary food source for wolves in Southeast Alaska, with moose being important in some areas. Wolf densities are higher in Unit 3 than in Interior regions of Alaska, but due to the dense forest cover, viewing opportunities are infrequent.

Government wolf control programs and bounties were maintained into the 1970s in an effort to increase deer numbers. Today a few recreational trappers and opportunistic sport hunters harvest wolves.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

Maintain a viable population in all areas of historic wolf range.

## METHODS

We monitored the wolf harvest through a mandatory pelt-sealing program. We collected data on the number of wolves killed, sex, date of take, method of take, method of transportation used from home to the field, and the estimated number of wolves associated with the ones killed. We collected the left foreleg from each sealed wolf to determine whether it was an adult or subadult.

In a cooperative program with the U.S. Forest Service, we radiocollared 1 female and 3 male wolves on Kupreanof Island.

We recorded observations of wolves made by Forest Service biologists, trappers, hunters and other members of the public. An annual statewide trapper survey supplied additional information.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

We did not collect sufficient data to make a meaningful estimate of wolf populations. Conversations with trappers, hunters, pilots, and other biologists and information from trapper questionnaires indicated the wolf population increased during the 1990's corresponding to the increase in deer numbers.

## MORTALITY

### *Harvest*

<u>Season and Bag Limit</u>	<u>Residents and Nonresidents</u>	
Trapping:	November 10–April 30	No limit
Hunting:	August 1–April 30	5 wolves

Board of Game Actions and Emergency Orders. There was no pertinent Board of Game actions or emergency orders issued during this report period.

Hunter/Trapper Harvest. In 1996/97, 24 individuals harvested 59 wolves, in 1997/98 23 individuals harvested 43 wolves, and in 1998/99 22 individuals harvested 34 wolves (Table 1). In 1997/98 adults comprised 58% of the kill, and in 1998/99 58% were adults (Table 2). Wolves were not aged in 1996/97.

Trapping is usually the primary method of take, but in 1998/99 18 of 34 harvested wolves were shot. Deer hunters, and occasionally moose hunters, are generally responsible for shot wolves.

Most of the wolf harvest takes place in close proximity to local communities. Much of Unit 3 is not trapped for wolves.

Harvest Chronology. In 1996/97, February, March, and April accounted for the highest percent of the harvest (Table 3). January and February accounted for the highest percentage of the harvest in 1997/98. In 1998/99, October, February, and April accounted for the highest percent of the harvest.

Transport Methods. Trappers using small boats (Table 4) harvest the majority wolves. Some trapping occurs from the road system on Mitkof and Wrangell islands. Other forms of transportation are rarely used.

## CONCLUSIONS AND RECOMMENDATIONS

Wolf populations and harvest have both increased in recent years. Much of Unit 3 is not trapped. I recommend no change in regulations.

### PREPARED BY:

Edward B. Crain  
Wildlife Biologist III

### SUBMITTED BY:

Bruce Dinneford  
Management Coordinator

Table 1 Unit 3 wolf harvest, 1988–98

Regulatory year	Reported harvest				Method of take			Successful trappers/hunters
	M	F	Unk.	Total	Trap/snare	Shot	Unk.	
1988/89	5	5	0	10	5	5	0	6
1989/90	12	10	0	22	12	10	0	13
1990/91	11	7	0	18	15	3	0	10
1991/92	26	25	0	51	33	17	1	25
1992/93	12	14	0	26	19	7	0	13
1993/94	27	19	2	48	37	11	0	20
1994/95	31	23	0	54	38	16	0	15
1995/96	27	13	0	40	26	13	1	20
1996/97	32	27	0	59	43	16	0	24
1997/98	25	16	2	43	29	14	0	23
1998/99	16	18	0	34	16	18	0	22

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Table 2 Age of Unit 3 harvested wolves<sup>1</sup>, 1997–98

Regulatory year	Adults	Subadults <sup>2</sup>	% adults
1997/98	22	16	58
1998/99	15	11	58

<sup>1</sup> Not all harvested wolves were aged.<sup>2</sup> Less than 1 year of age.

Table 3 Unit 3 wolf harvest chronology, percent by month, 1988–98



Table 3 Unit 3 wolf harvest chronology, percent by month, 1988–98

Regulatory year	Harvest periods													<i>n</i>
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	Unk	
1988/89	10	0	10	0	0	0	0	50	0	20	10	0	0	10
1989/90	0	9	9	16	0	32	13	4	13	4	0	0	0	22
1990/91	0	6	0	6	0	11	28	22	16	11	0	0	0	18
1991/92	0	0	8	8	14	8	15	15	12	10	6	4	0	51
1992/93	0	0	15	4	0	12	35	0	15	19	0	0	0	26
1993/94	0	4	4	9	4	27	20	10	13	9	0	0	0	48
1994/95	0	2	4	2	11	15	20	7	11	9	0	0	19	54
1995/96	0	2	5	13	8	23	12	18	15	2	2	0	0	40
1996/97	0	0	3	5	7	10	7	20	24	22	2	0	0	59
1997/98	0	0	7	9	9	7	19	26	9	14	0	0	0	43
1998/99	0	0	6	18	9	3	12	8	18	26	0	0	0	34

Table 4 Unit 3 wolf harvest, percent by transport method, 1988–98

Regulatory year	Percent of harvest							<i>n</i>
	Airplane	Boat	3/4 wheeler	Snowmachine	ORV	Highway vehicle	Other	
1988/89	10	70	0	0	0	20		10
1989/90	0	77	5	0	0	18		22
1990/91	0	72	0	17	0	11		18
1991/92	4	69	0	0	0	22	6	51
1992/93	4	85	0	0	0	12		26
1993/94	4	81	0	0	0	13	2	48
1994/95	0	89	0	4	0	5	2	54
1995/96	0	85	0	0	0	13	2	40
1996/97	1	73	0	0	19	7		59
1997/98	2	85	2	0	2	9		43
1998/99	6	74	0	0	0	20		34

## **LOCATION**

**GAME MANAGEMENT UNIT:** 5 (5800 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Cape Fairweather to Icy Bay, eastern Gulf Coast

## **BACKGROUND**

Lifelong residents of Yakutat report that wolves were present on the Yakutat Forelands prior to the immigration of moose in the early 1930s (ADF&G files). Klein (1965) suggested that wolves reached this area through the Alsek/Tatsenshini River valley. Interestingly, there were no reports of wolves on the west side of Yakutat Bay (Unit 5B) before 1971, well after moose were established there. However, based on anecdotal information, a viable wolf population was probably established there by 1976.

In the winter of 1977, Yakutat Area Wildlife Biologist R. Quimby estimated a minimum of 6 different packs in Unit 5A, including Situk, Ahrnklin, Dangerous/Italio, Akwe, Tanis Mesa/East Alsek, and Doame/Clear packs. He estimated minimum pack sizes of 9, 7, 6, 3, 5, and 6, respectively, for a total of 36 wolves. He extrapolated this to a minimum of 45–50 animals (pre-pupping), estimating a density of 1 wolf/15 mi<sup>2</sup>. However, the presence of a breeding population of wolves in Unit 5B was undetermined at that time. In winter 1979, area wildlife biologist R. Ball estimated the Unit 5A and 5B populations at 35 and 10 wolves minimum, respectively. By 1980 Ball felt wolf numbers were stable or increasing in Unit 5A, with a population estimate of 50 animals. By 1982 Ball suggested there might be a minimum of 12 wolves in Unit 5B in 2 packs. In 1985 B. Dinneford reported an increased number of accounts from local residents of moose mortality in winter months. These accounts may have reflected an increasing wolf population, responding to a larger moose population. Wolves probably subsisted mostly on mountain goats and salmon before the arrival of moose in the area. Salmon are considered very important for wolf maintenance, especially as a late fall/early winter food source.

Because of the decline in moose numbers and the apparent predation on moose by wolves, an attempt was made to reduce wolf numbers from 1974–76. This effort was unsuccessful, with only 1 wolf killed during 31 hours of aerial hunting. Bad weather, rough terrain, and dense forest prevented a higher take.

During the report period, interest in taking wolves in the subunit increased somewhat, primarily because of the efforts of a single trapper.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

No formal management goals have been established for wolves in this unit, however, general management objectives are to regulate seasons and bag limits to maintain populations of wolves for viewing and harvest. Our management strategy is to maintain wolf harvests at a level similar to the mean for the previous 5 seasons. No wolf control methods are contemplated for this area at this time.

## METHODS

Through the mandatory sealing of wolves taken by successful hunters and trappers we collected the following data: date and method of take, sex, transportation mode, and number of animals in the pack the wolf was taken from. We also required hunters and trappers to leave the lower front leg bone attached to the hide for sealing. We used this bone to separate wolves into 3 age categories, including juveniles (less than 1 year of age), yearlings, and adults. ADF&G and Fish and Wildlife Protection staff in Yakutat sealed wolves. The population was monitored by whatever means were available, including anecdotal reports, aerial survey sightings, discussions with hunters and trappers, and information collected from the annual statewide trapper surveys.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

We did not collect sufficient data to make meaningful estimates of wolf populations within the Unit. Although no quantitative data is available, anecdotal reports and discussions with local hunters, trappers, and pilots suggest wolf numbers are stable.

### MORTALITY

#### *Harvest*

#### Seasons and Bag Limits

Hunting:	August 1–April 30	5 Wolves
Trapping:	November 10–April 30	No Limit

Board of Game Actions and Emergency Orders. No Board of Game actions or emergency orders were issued for this unit during the report period.

Hunter/Trapper Harvest. Difficult travel conditions and inconsistent weather (heavy snows often changing to rain) in the Yakutat area restricts hunting and trapping effort for wolves.

Twenty-four wolves (8 males and 16 females) were taken in Unit 5 during the 1996 regulatory year (Table 1). This is almost twice the harvest as recorded in any other year since 1998 (Table 1), and one local took 75% of these wolves resident. This compares to the prior 5-year mean of 9.6 (range = 4–13). Eleven wolves were killed in the Situk/Ahrnklin rivers area, 4 in the Dangerous River area, 2 in Russell Fiord, and 2 west of Yakutat Bay in Unit 5B. In 1997, 3 wolves (2 males, 1 female) were harvested. This compares to the prior 5-year mean of 12.2 (range = 3–24). One was taken along the Alsek River, 1 from Russell Fiord, and 1 from the Akwe River. In 1998, 7 wolves (4 males, 3 females) were harvested. Three were taken near Harlequin Lake, 2 near the Akwe River, 1 near the Old Situk River, and 1 from Unit 5B.

Trapping and snaring continue to be the primary method of take. The combined harvest for 1996–1998 was 34 wolves, comprising 19 (56%) taken in traps or snares, and 15 (44%) that were shot. There were 12 white wolves, 11 gray, 7 black, and 3 of unknown color.

Hunter/Trapper Residency and Success. In 1996, 5 local residents and 2 nonresidents accounted for the entire wolf harvest. In 1997, 2 local residents, 1 non-local Alaskan, and 1 nonresident accounted for the harvest. In 1998, 4 local residents and 1 nonresident reported taking wolves. All wolves harvested by nonresidents were shot, almost always while hunting other game such as bear or moose.

Harvest Chronology. Trapping harvest occurred throughout the winter months (Table 2), although in 1996 twelve wolves were taken in March and April. It is worth noting that this intensive spring effort was the result of 1 trapper.

Transport Methods. During the report period successful trappers and hunters used varied transport modes, showing little consistency year to year (Table 3). Because of the small harvest, 1 or 2 serious trappers using consistent transport methods dominate this category.

#### *Other Mortality*

In 1997 a vehicle on Forest Service Road 10 killed a male wolf, and another was found dead in a snare after the close of the trapping season.

## CONCLUSIONS AND RECOMMENDATIONS

Our knowledge of the wolf populations in Unit 5 is limited to information provided by hunters, trappers, local pilots, trapper surveys, and incidental observations by Department of Fish and Game staff. From these data sources, it appears that the wolf population is stable throughout the unit. The populations of moose and mountain goats are doing well, and along with the few deer and abundant beaver in the area, these prey species should continue to support wolves. Because of the difficult access and inclement weather in most of the unit, the pressure exerted on the overall wolf populations will probably remain low. No changes in seasons or bag limits are recommended at this time.

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#### PREPARED BY:

Neil L. Barten  
Wildlife Biologist III

#### SUBMITTED BY:

Bruce Dinneford  
Management Coordinator

Table 1 Unit 5 wolf harvest, 1988–1998

Regulatory year	Males	Females	Unknown	Total
1988	3	5	0	8
1989	7	6	0	13
1990	4	3	0	7
1991	8	3	0	11
1992	2	2	0	4
1993	6	3	0	9
1994	10	2	3	15
1995	6	3	0	9
1996	8	16	0	24
1997	2	1	0	5
1998	4	3	0	7

Table 2 Unit 5 wolf harvest chronology by month, 1988–1998

Regulatory year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1988			2	1	1	1		2			1	
1989			4	1	1				1	2	4	
1990			1	1	1		1			1	2	
1991		2	1			1		3	3	1	2	
1992			1	1						2		
1993		1				1	2	1		4		
1994			2		1	3		3	3	2		
1995			1			1	2	1	3	1		
1996			3	2	2		4	1	11	1		
1997			1	1		1						
1998			2	3						2		

Table 3 Unit 5 wolf harvest percent by transport method, 1988–1998

Regulatory year	Airplane	Dogsled, skis, & snowshoes	Boat	3 or 4 wheeler	Snow- machine	ORV	Highway vehicle	Unknown
1988	88			12				
1989	38		8	15		8	31	
1990	43		43		14			
1991	46	8		38			8	
1992	75		25					
1993	44		22				33	
1994	7		2				5	
1995	44			11			33	11
1996	25			75				
1997	67		33					
1998	86		14					

## LOCATION

**GAME MANAGEMENT UNIT:** 6 (10,140 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Prince William Sound and North Gulf Coast

## BACKGROUND

The wolf population in Unit 6 was low during the early and mid-20th century (Griese 1989). Heller (1910) reported tracks in Nelson Bay in Unit 6D, and locals indicated wolves were present east of Nelson Bay. Significant ungulate prey became available in the mid 1900s as a result of successful Sitka black-tailed deer and moose introductions. However, increases in the wolf population were prevented by federal control efforts in the 1940s and 1950s. By the 1970s numbers began to increase, particularly in Units 6A, 6B, and 6C, where moose were well established. They peaked in the mid 1980s. The population declined during the late 1980s (Carnes et al. 1996) and stabilized at a lower density during the 1990s (Nowlin 1997). Wolves inhabit the mainland throughout Unit 6. However, they have not become established on the major islands in Unit 6D where deer would be adequate prey.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

To maintain a wolf population in a minimum of 5 packs that will sustain an annual harvest of 10 wolves.

## METHODS

No systematic wolf surveys were completed. I estimated population size and distribution before the trapping season, using U.S. Forest Service data and incidental observations by staff and the public. Forest Service data were collected during 1992–96 in Units 6A, 6B and 6C using radiotelemetry (Stephenson et al. 1993, Carnes et al. 1996).

We collected harvest data by sealing hides of wolves taken by trappers and hunters. We recorded location and date of harvest, method of take, transportation mode, sex, and pack size.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

The wolf population was approximately 48–62 in 1998–99, composed of 8 packs and loners. Numbers were probably stable over the past 5 years.



### *Distribution*

Numbers varied among units in 1998–99. Unit 6A had approximately 24–30 wolves with 4 packs present. Unit 6B had 14–17 with 2 packs. Unit 6C had 2–4 lone wolves, and Unit 6D had 10–14 wolves with 3 packs.

## **MORTALITY**

### *Harvest*

Season and Bag Limit. The hunting season was from 10 August to 30 April, with a bag limit of 5 wolves. The trapping season was 10 November to 31 March, with no bag limit.

Board of Game Actions and Emergency Orders. The Board of Game took no actions and no emergency orders were issued during this reporting period.

Hunter/Trapper Harvest. Reported annual harvest during this reporting period was 6–12 wolves, composed of 27–67% females (Table 2). Nine wolves were trapped and 11 shot. Total estimated unreported and illegal harvest was 4–5. Harvest of 12 wolves during 1996/97, most in Unit 6A, was the highest on record

Hunter Residency and Success. The number of successful hunters and trappers was 5–11.

Harvest Chronology. Wolves were taken throughout the season during 1996/97, and from November through April during 1997/98 (Table 3). Heavy snowfall during 1998/99 restricted hunting and trapping effort to early and late in the season.

Transport Methods. During this reporting period the primary methods of transportation were airplanes, snowmachines and highway vehicles (Table 4).

## **CONCLUSIONS AND RECOMMENDATIONS**

The population objective was achieved. Number of packs exceeded the minimum of 5. The 40–60 wolves in the population were lightly harvested and could sustain the take of 10 animals specified in the objective. No management changes are recommended.

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**PREPARED BY:**

David W. Crowley  
Wildlife Biologist II

**SUBMITTED BY:**

Michael G. McDonald  
Wildlife Biologist III

Table 1 Unit 6 fall wolf population estimates<sup>a</sup>, 1994–98

Regulatory Year	Population estimate	Number of packs	Basis of estimate
1994/95	40–60	9	b
1995/96	47–61	8	b,c
1996/97	46–61	10	b,c
1997/98	44–58	9	b,d
1998/99	48–62	8	b,d

<sup>a</sup> Pre-trapping season.

<sup>b</sup> Incidental observations.

<sup>c</sup> Radiotelemetry (Carnes et al. 1996).

<sup>d</sup> US Forest Service, Cordova Ranger District telemetry.

Table 2 Unit 6 wolf harvest, 1994–98

Regulatory Year	Reported harvest				Estimated harvest		Method of take			Successful Total trap/hunt
	M	F	(%)	Total	Unreported	Illegal	Trap/snare	(%)	Shot	
1994/95	0	0	(0)	0	1	3	0	(0)	0	0
1995/96	3	2	(40)	5	2	4	1	(20)	4	5
1996/97	8	3	(27)	12	2	3	5	(50)	5	11
1997/98	4	2	(33)	6	2	2	3	(60)	2	4
1998/99	2	4	(67)	6	2	2	1	(20)	4	5

Table 3 Unit 6 wolf harvest chronology percent, 1994–98

Regulatory Year	Harvest periods									<i>n</i>
	August	September	October	November	December	January	February	March	April	
1994/95	0	0	0	0	0	0	0	0	0	0
1995/96	0	40	20	0	0	20	20	0	0	5
1996/97	8	8	17	0	25	8	25	0	8	12
1997/98	0	0	0	33	0	17	17	0	17	6
1998/99	0	33	33	0	0	0	0	33	0	6

Table 4 Unit 6 wolf harvest percent by transport method, 1994–98

Regulatory Year	Percent of harvest						<i>n</i>
	Airplane	Dogsled skis Snowshoes	Boat	Snow- machine	ORV	Highway vehicle	
1994/95	0	0	0	0	0	0	0
1995/96	40	0	20	20	0	20	5
1996/97	20	10	0	30	0	40	10
1997/98	20	0	0	60	20	20	5
1998/99	50	0	0	0	0	50	6



## LOCATION

**GAME MANAGEMENT UNITS:** 7 and 15 (10,637 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Kenai Peninsula

## BACKGROUND

Following a half-century absence, wolves recolonized the Kenai Peninsula during the 1960s. The first recent documentation was in 1961 when Jack Didrickson (ADF&G) observed a single wolf between Skilak and Tustumena Lakes. Observations increased throughout the 1960s, with the first pack sighting (10 wolves) in 1968 by Dimitri Bader (ADF&G).

The high density of moose and severe winters from 1971 through 1975 made moose easily available prey. In less than 15 years, wolves repopulated most suitable habitat. Peterson and Woolington (1981) estimated wolves annually killed 9–15% of the moose calves and 5–7% of adult moose on the Kenai Peninsula.

Aerial track counts and observations by trappers conducted from 1975 to 1999 indicated the Kenai Peninsula wolf population increased rapidly during the early 1970s, then remained relatively stable at 200 animals. According to Peterson and Woolington (1981), annual mortality of radio-collared wolves in Subunit 15A was 38%. Pups composed 37% of the early winter population, reflecting the stability of the population in the northern portion of the Kenai Peninsula from 1976 to 1981. Natural mortality rates were low, despite the 1970s growth rate of the wolf population. Mortality rates, however, may be increasing because of the dense population of wolves and declining prey.

Regulated wolf harvests on the Kenai Peninsula began with a permit hunt during the winter of 1973/74; 2 wolves were harvested. During the winter of 1974/75, 6 were harvested. Hunting and trapping were allowed the following season (1975/76), and the harvest increased to 19, 12 by trappers and 7 by hunters. Although the 9-month season was liberal, the harvest of wolves increased slowly until 1978/79, when 55 wolves were taken. The harvest from 1978/79 to 1986/87 ranged from 42 to 64 wolves and averaged 51, suggesting 25% of the estimated population was removed annually from 1978 to 1987.

In 1987 the Kenai National Wildlife Refuge imposed a 4-day trap check for trappers using most refuge-managed lands and the season was reduced. These restrictions reduced the harvest which, over the next 12 years, ranged from 9 to 49 wolves and averaged 24 animals, 12% of the estimated population.

Historically, most of the wolf harvest has been during trapping season, while most nonconsumptive uses were in summer and early fall. Almost all wolves have been taken for recreational purposes; the dollar value received for pelts has been a secondary benefit. Although some hunters have used aircraft to locate wolves, trappers and hunters operating from the road system have killed most wolves. In the spring of 1986, the Board of Game prohibited the use of aircraft to locate wolves for the purpose of landing and shooting them. The land-and-shoot

method was responsible for only 6% of the annual harvests from 1973 to 1985, occurring in only 5 of the 12 years. The low harvest was attributable to poor tracking and landing conditions in heavily forested areas, and the refuge was closed to aircraft.

An infestation of biting lice (*Trichodectes canis*) was identified from 2 packs of wolves during 1982/83. Wolves from these packs in Subunit 15A were brought in for sealing by local trappers, and department and refuge personnel initiated a control program to treat all infested wolves. Wolves were both captured and treated, or a medication (Ivermectin) was injected into moose recently killed by wolves or placed in treated baits near kills. Both methods proved unsuccessful, and the incidence of infestation spread rapidly across the Kenai. Infested wolves are common; using acceptable means, we have little chance to control the parasite.

Following exhaustive searches over the years, infested wolves were only found on the Kenai Peninsula until they were discovered in Units 14 and 16 in December 1998. Three packs, totaling approximately 28 animals, were identified with *T. canis*. Treatment efforts by the department and harvesting of wolves by local trappers from these packs, treated or removed most of the infested wolves.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

- To maintain a postseason population of 25–35 wolves in Subunit 15A, excluding the Indian and Quartz Creek/Mystery creek packs.
- To maintain the spring wolf population at a maximum ratio of 1 wolf:50 moose in Subunits 15B and 15C and Unit 7.

## **METHODS**

Experienced pilots and observers conducted aerial surveys during November and December but only under suitable snow and tracking conditions. Local trappers provided additional information concerning wolf pack distribution and size for unsurveyed areas. We monitored harvest by sealing the pelts of harvested wolves.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size*

Wolf surveys were not conducted over the entire Kenai Peninsula because of unfavorable snow conditions during early winter. Harvest data, observations by department staff, and reports from trappers indicated the number of wolves probably increased from previous years. However, lacking complete survey data, the estimated population for Units 7 and 15 remained at 200 wolves in 20 packs (Tables 1 and 2).

## **MORTALITY**

### *Harvest*

Season and Bag Limits. The hunting season in Units 7 and 15 was 10 August to 30 April. The bag limit was 5, except on the Kenai National Wildlife Refuge where the bag limit was 2 wolves.

The wolf trapping season in Units 7 and 15 was 10 November to 31 March, and there was no bag limit.

Board of Game Actions and Emergency Orders. The Board of Game increased the season length for trapping of wolves on the Kenai Peninsula by 31 days. Previously the season ended on 28 February.

Hunter/Trapper Harvest. Twenty-four wolves were killed during the hunting and trapping seasons in 1997/98, and 49 in 1998/99 in Units 7 and 15 (Table 3). The sex ratio was 14 (58%) males and 10 (42%) females in 1997/98 and 25 (56%) males and 20 (44%) females in 1998/99 (Tables 4 and 5). The mean annual harvest (37) for these 2 years represented an annual harvest rate of 19% of the estimated population.

The combined harvest for 1997/98–1998/99 was 73 wolves, comprising 37 (51%) taken by trapping or snaring and 35 (49%) by ground shooting (n=72).

Harvest Chronology. The combined harvest chronology for 1997/98–1998/99 was August, 1 (1%); September, 6 (8%); October, 4 (5%); November, 3 (4%); December, 9 (12%); January, 18 (25%); February, 14 (19%); March, 9 (12%), and Other, 9 (12%). Twenty-seven percent (20) of the harvest occurred before or after trapping season (Table 6).

Transport Methods. Transportation methods used to access traplines varied each year, depending on snow and ice conditions. Combined methods ( $n = 64$ ) for 1997/98–1998/99 were aircraft 0 ; horse/dog team 1 (2%); boat 1 (2%); ATV 1 (2%); snowmachine 45 (70%), and highway vehicle 16 (25%).

## **CONCLUSIONS AND RECOMMENDATIONS**

A mean annual harvest of 37 wolves during the past 2 years represents 19% of the early winter population estimate of 200 for Units 7 and 15. With this low rate of harvest, the wolf population will probably be controlled by prey abundance, increased dispersal, and natural mortality.

The department and U S Fish and Wildlife Service (FWS) signed an agreement in 1988 to manage wolves in Unit 15A using a harvest quota system. Terms of this agreement were based on continuing the current level of harvest opportunity while protecting the wolf population from overharvest. In addition to this agreement, the FWS implemented several new restrictions on trappers using the refuge. These restrictions included a mandatory trapper orientation course before obtaining a permit, closures to trapping (except mink and muskrat) within 1 mile of a road and 2 miles from a trailhead or campground, prohibition of toothed traps and the requirement that traps be tagged by the owner. These new permit conditions to trap on the refuge, a limited season



on lynx harvest by the Board of Game, and the poor quality of lice-infested wolf pelts have reduced trapper effort and opportunity.

I recommend that we discontinue the quota system for Unit 15A. With low effort and harvest (average 8 from 1994–1999), it is not warranted or cost effective. The management strategy for Unit 15A essentially mandates we manage wolves pack by pack. I recommend we consider the entire wolf population on the Kenai Peninsula as one population, accepting the fact that some packs living close to developed areas will sustain heavy harvests in some years. The increased harvest in 1998/99 was probably the result of an increase in wolf density. Wolf survival probably increased during the severe winters of 1997/98 and 1998/99 when large numbers of moose died from winter stress. Allowable harvest should not exceed 35% or a 3-year mean annual harvest of 70 wolves.

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**PREPARED BY:**

Ted H. Spraker  
Wildlife Biologist

**SUBMITTED BY:**

Michael G. McDonald  
Assistant Management Coordinator

Table 1 Unit 7 fall wolf population estimate<sup>a</sup>, 1994–1999

Year	Population estimate	Number of packs	Basis of estimate
1994/95	45	6	b
1995/96	45	6	b
1996/97	45	6	b
1997/98	45	6	b
1998/99	45	6	b

<sup>a</sup> Fall estimate = pretrapping season population.

<sup>b</sup> Estimates derive from incidental observations of staff, sealing records, and reports from public.

Table 2 Unit 15 fall wolf population estimates<sup>a</sup>, 1994–99

Year	Population estimate	Number of packs	Basis of estimate
1994/95	155	14	b
1995/96	155	14	b
1996/97	155	14	b
1997/98	155	14	b
1998/99	155	14	b

<sup>a</sup> Fall estimate = pretrapping season population.

<sup>b</sup> Results of research and management studies in addition to incidental observations and trapper reports.

Table 3 Known wolf mortality in Units 7 and 15, 1994–1999

Year	Unit				Total
	7	15A	15B	15C	
1994/95	7	7	3	3	20
1995/96	17	6	10	9	42
1996/97	9	10	5	6	30
1997/98	7	7	2	8	24
1998/99	12	9	7	21	49

<sup>a</sup> Trapping season 10 November–28 February.

Table 4 Unit 7 wolf harvest, 1994–99

Regulatory year	<u>Reported Harvest</u>			<u>Method of Take</u>			Successful Trappers/hunters
	M	F(%)	Unk	Trap/snare (%)	Shot	Unk	
1994/95	3	4(57)	0	3(43)	4	0	6
1995/96	11	5(31)	1	11(65)	6	0	12
1996/97	3	6(67)	0	5(63)	3	1	7
1997/98	6	1(17)	0	4(57)	3	0	6
1998/99	8	3(27)	1	7(58)	5	0	10

Table 5 Unit 15 wolf harvest, 1994–99

Regulatory year	<u>Reported Harvest</u>			<u>Method of Take</u>			Successful Trappers/hunters
	M	F(%)	Unk	Trap/snare (%)	Shot	Unk	
1994/95	5	7(67)	1	9(69)	4	0	9
1995/96	11	14(56)	0	12(48)	13	0	17
1996/97	12	9(43)	0	10(48)	10	1	17
1997/98	8	9(53)	0	7(41)	10	0	14
1998/99	17	17(50)	3	19(53)	17	1	27

Table 6 Harvest chronology for wolves in Units 7 and 15, 1994–1999

Year	Month									Total
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Other	
1994/95	0	5	0	1	5	1	7	1	0	20
1995/96	4	2	1	4	12	8	4	7	0	42
1996/97	1	4	0	1	3	9	8	3	1	30
1997/98	0	3	4	0	5	4	3	0	5	24
1998/99	1	3	0	3	4	14	11	9	4	49



## **LOCATION**

**GAME MANAGEMENT UNITS:** 9 (33,638 mi<sup>2</sup>) and 10 (1586 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Alaska Peninsula and Unimak Island

## **BACKGROUND**

Wolves are found throughout the Alaska Peninsula (Unit 9) and on Unimak Island (Unit 10) in low-to-moderate densities. Specific data on historic wolf abundance are lacking, but the population was reduced by wolf control work during the 1950s. After the end of the federal wolf control program, wolves increased and thereafter were primarily affected by prey abundance and periodic outbreaks of rabies. Conditions favorable for land-and-shoot and ground-based trapping have been rare over the past 20 years, so harvests have had relatively little influence on wolf numbers.

Prey abundance has varied during the past 30 years. Moose densities increased during the 1950s and 1960s and then decreased during the 1970s in all areas north of Port Moller. Moose numbers have been relatively stable during the past 20 years. The Mulchatna caribou herd increased from about 14,000 in 1974 to over 200,000 in 1996. The Northern Alaska Peninsula Caribou Herd (NAPCH) increased from about 13,000 in the mid-1970s to about 20,000 in 1984. During the next 10 years, the NAPCH remained relatively stable at 15,000–18,000. During the 1993–94 regulatory year, it declined to about 12,500; and has continued to decline during the rest of this reporting period. Caribou decreased dramatically on Unimak Island from a peak of 5000 in 1975 to only a few hundred by 1977. No change in caribou numbers on Unimak Island occurred during the next 20 years, but during the late 1990s the herd has grown to about 600. The mainland segment of the Southern Alaska Peninsula Caribou Herd (SAPCH) peaked at over 10,000 in 1983, and then declined to 2000 by 1995. This segment of the SAPCH has recovered to about 3600 by 1999.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

During the previous reporting period, the management objective was to maintain a wolf population that will sustain a 3-year-average annual harvest of 50 wolves. Given the limitations imposed by climate and budget, it was impractical to set a management goal based on a desired wolf density or total population when there is no feasible way to measure whether we were meeting the objective.

## **METHODS**

Specific data were not collected on wolf densities in Units 9 or 10. We monitored trends through observations during other fieldwork, reports from hunters and guides, and responses to the annual trapper questionnaire. We monitored harvests from mandatory pelt-sealing reports.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

By piecing together observations of wolf packs and general knowledge of territory size, I estimate that Units 9 and 10 contain approximately 350 wolves. This is a conservative estimate, but it cannot be refined without considerable expense, combined with abnormally good snow and flying conditions.

Wolf numbers appear to have increased throughout Unit 9, despite the decline of the NAPCH since 1993. Although relatively few trapper questionnaires have been returned in recent years, trappers generally agree that wolf abundance has increased during this reporting period.

### MORTALITY

#### *Harvest*

Season and Bag Limits. The hunting season in Units 9 and 10 was 10 August to 30 April, and the bag limit was 5 wolves. The trapping season in Units 9 and 10 was 10 November to 31 March with no bag limit.

Board of Game Actions and Emergency Orders. No actions were taken that specifically pertained to Units 9 or 10.

Hunter/Trapper Harvest. The wolf harvest for 1996-97, 1997-98 and 1998-99 were 37, 72, and 91, respectively, in Unit 9 (Table 1). No wolves were sealed from Unit 10 during this reporting period.

Hunter Residency and Success. Furbearer harvest records from sealing certificates do not contain information on individual hunters or trappers, so no information on residency or success is available.

Harvest Chronology. Harvest chronology continues to peak December-March (Table 2).

Transport Method. Inaccurate reporting of the method of transportation used for harvesting wolves hampers analysis; however, most harvesters used aircraft or snowmobile (Table 3).

#### *Other Mortality*

One rabid wolf was confirmed in Port Heiden, and a number of rabid red foxes and 1 coyote were reported elsewhere in Unit 9E during 1998.

### HABITAT

#### *Assessment*

No significant alteration to habitats occurred in Units 9 and 10 during this report period.

## CONCLUSIONS AND RECOMMENDATIONS

The wolf harvest in Unit 9 varies widely, depending on weather conditions and the activity of several individuals who use aircraft. Harvest has had little effect on the wolf populations in Units 9 and 10. For practical and budgetary reasons, it is unlikely that more accurate estimates of population size will be possible. Sealing data on sex composition of harvest and methods of take and transportation do not seem reliable; analyses using these data are not recommended. I recommend no regulatory changes.

**PREPARED BY:**

Richard A. Sellers  
Wildlife Biologist III

**SUBMITTED BY:**

Michael G. McDonald  
Assistant Management Coordinator



Table 1 Units 9 and 10 wolf harvest, 1994/95–1998/1999

Regulatory Year	Reported harvest				Method of take			Successful Trappers/Hunters
	M	F	Unk	Total	Trap/Snare	Shot	Unk	
1994/95	16	13	0	29	14	14	0	14
1995/96	20	10	1	31	10	21	0	19
1996/97	19	15	3	37	5	31	1	21
1997/98	36	30	6	72	51	21	0	43
1998/99	57	32	2	91	60	25	6	41

Table 2 Units 9 and 10 wolf harvest chronology percent, 1994/95–1998/99

Regulatory Year	August	September	October	November	December	January	February	March	April	<i>n</i>
1994/95	0	14	7	14	0	24	7	3	0	29
1995/96	3	6	16	3	6	45	16	3	0	31
1996/97	3	19	3	8	19	11	24	14	0	37
1997/98	0	10	11	7	15	24	28	3	3	72
1998/99	1	1	1	0	3	24	24	34	3	91

Table 3 Units 9 and 10 wolf harvest percent by transport method, 1994/95–1998/1999

Regulatory Year	Dogsled			3- or 4- Wheeler	Snowmachine	ORV	Highway Vehicle	Unknown	<i>n</i>
	Airplane	Skis Snowshoe	Boat						
1994/95	21	0	3	0	45	0	0	31	29
1995/96	58	0	0	0	16	0	0	10	31
1996/97	41	0	8	8	22	3	3	15	37
1997/98	32	0	0	21	39	3	5	0	72
1998/99	3	0	0	7	78	0	4	8	91

## LOCATION

**GAME MANAGEMENT UNIT:** 11 (13,257 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Wrangell Mountains

## BACKGROUND

Wolf population estimates and trends are unavailable for Unit 11 before the 1950s. Skoog (1968) assessed that wolf numbers were low from 1900 to the 1930s, then increased, according to written accounts by settlers. In 1948 the U.S. Fish and Wildlife Service initiated an extensive wolf control program that lasted until 1953. Following termination of the control program, wolf numbers increased and probably peaked during the mid-1960s. In the early 1970s, wolves were still abundant (McIlroy 1974) with 1 wolf/80 mi<sup>2</sup>, a unit population of 100–125 animals. Population estimates were not made until 1985. The Unit 11 wolf population has been stable the last 10 years.

Although the size of wolf harvests before mandatory sealing is unknown, harvests were probably similar to harvests reported during the early 1970s because trapping seasons were comparable and there were no bag limits. Wolf harvests since 1972 have averaged 26 wolves per year, ranging widely from 6 to 51 wolves per year.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

- To maintain a minimum posthunting and trapping season population of 75 wolves.
- The human-use objective is to allow limited human harvests when they do not conflict with management goals for the unit or objectives for the population.

## METHODS

We monitor the annual wolf harvest by sealing the hides of all wolves harvested in the unit. We collected information on wolf numbers and distribution from interviews with hunters and trappers when pelts were sealed and from incidental observations while conducting surveys for other species. No aerial track surveys were conducted in Unit 11 during this reporting period.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

The spring 1998 and 1999 population estimates for Unit 11 were identical at 70–85 wolves in 10–12 packs (Table 1). Wolf numbers were similar to the 5-year (1993–97) mean population estimate of 80 wolves in Unit 11. Using survival rates for exploited wolf populations (Ballard et al. 1987), the estimated fall 1999 wolf population in Unit 11 was between 100 and 115 wolves.

### *Distribution and Movements*

Wolf numbers were higher in the northern portions of the unit, especially from the Dadina River northeast to the Copper River. Caribou were available to wolves at least part of the year in this area, and moose were more abundant than in the southern portions of the unit. Telemetry data during the winter of 1996–97 showed some wolves also use the higher elevations, suggesting they also target sheep as prey. Wolf numbers in the lower Chitina river valley remain lower than in the northern portion of the unit because caribou are absent and moose less abundant. Wolves heavily utilized sheep and mountain goats in the lower Chitina Valley, but because of their smaller body size and difficult terrain, these prey did not support as large a wolf population.

### **MORTALITY**

#### *Harvest*

Season and Bag Limit. The hunting season in Unit 11 was from 10 August to 30 April and the bag limit was 5 wolves. Trapping season was from 10 November to 31 March and there was no bag limit.

Board of Game Actions and Emergency Orders. In 1993 the Board of Game passed a regulation allowing trappers to shoot wolves same-day-airborne, if the trapper was 300 feet away from the aircraft before shooting. Methods and means for taking wolves in Unit 11 remained unchanged until Proposition 3 passed during the November 1996 general election. This referendum prohibited taking of wolves the same day airborne unless the wolf was in a trap or snare, effective 25 February 1997.

Hunter/Trapper Harvest. Hunters and trappers harvested 36 wolves from Unit 11 during the 1998–99 season (Table 2). Harvests during this reporting period fluctuate between years but the 5 year average take of 25 wolves is similar to the 26 wolf average harvest since 1972, when sealing of wolves became a requirement. Males composed 49% of the take during this reporting period, down slightly from 57% of the reported harvest during 1991–95. Hunters and trappers reported taking most of the wolves from either the Nabesna Road or along the Copper River. This harvest pattern was similar to past years when harvests were near areas with easy access.

The harvest methods for wolves killed in Unit 11 over the past 8 years are provided in Table 2. Over the period 1994–99, trapping and snaring accounted for 91% of the harvest for which the method of take was known. Prior to 1987, when land-and-shoot was legal, this harvest method was popular and accounted for 25% of the wolf harvest between 1980 and 1987. Unreported and illegal harvests were minimal during the reporting period.

Hunter/Trapper Residency and Success. During the 1998–99 season, 8 individuals sealed an average of 4.5 wolves from Unit 11. During the preceeding 5 seasons, the average harvest was 3.1 wolves per individual. Most individuals sealing wolves from Unit 11 live in the unit or in rural communities adjacent to the unit.

Harvest Chronology. Table 3 presents the harvest chronology for wolves over the past 5 years. The proportion of the harvest by month has varied yearly, but January and February had the highest harvest. The annual harvest chronology for trapped wolves probably reflected conditions

for snowmachine travel (snow depth, river ice, and weather conditions), rather than any pattern of trapper effort or success. The number of wolves taken during the fall months, presumably by big game hunters, has ranged from 1 to 4 since 1985 and includes most of the nonresident take.

Transport Methods. The method of transport used in harvesting wolves has only been recorded on sealing certificates since 1985. In Unit 11 most wolves have been taken with the use of snowmachines (Table 4).

The use of aircraft has declined since land-and-shoot became illegal. Trappers who use aircraft to fly out and make sets have taken very few wolves; however, this trapping method may increase. Aircraft can be used effectively to find wolf kills, and a trapper can land and set snares for returning wolves at the kill site. Most aircraft use was by hunters who took a wolf incidentally while on fly-in hunting trips for other big game.

#### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

Wolf estimates are difficult to assess in Unit 11. All wolf estimates for the unit are based on pack or track sightings by department staff, hunters, trappers, and the public. Track surveys have been done only periodically and in different locations since 1978. The lack of a systematic survey method hampers efforts to estimate wolf numbers. Even establishing a yearly trend area will not assure yearly population estimates. The occurrence of high winds in Unit 11 often obscures tracks or blows snow to the extent that surveys are not feasible. The use of radiocollared wolves would provide more accurate information on wolf numbers in this unit.

### **CONCLUSIONS AND RECOMMENDATIONS**

The number of wolves estimated to inhabit Unit 11 has remained relatively stable throughout this report period and is approaching the number of wolves estimated in the late 1980's. Wolf population estimates in Unit 11 fluctuate yearly as a direct result of survey effort and snow conditions that affect survey results. However, wolf estimates are considered a minimum because of the limited data available for many large areas in the unit.

Harvest rates have varied over the last 5 years in Unit 11. The wolf harvest rate for this period was 23% of the estimated fall population, up from 20% during the previous report period. Most wolf harvest in Unit 11 is concentrated near access points and inhabited areas where trappers live. High harvest rates concentrated in these areas could result in localized population declines. In vast portions of the unit, however, wolves are not hunted or trapped. The reasons are that aircraft use is illegal, much of the unit is without roads, and physical barriers such as large rivers and mountains limit snowmachine and ORV travel.

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**PREPARED BY:**

Robert W. Tobey  
Wildlife Biologist

**SUBMITTED BY:**

Michael G. McDonald  
Assistant Management Coordinator

Table 1 Unit 11 fall and spring wolf population estimates<sup>a</sup>, 1994-2000

Year	Population estimate		Packs	Basis of estimate
	Fall	Spring		
1994/95	105-125	65-80	11	b, c
1995/96	95-115	80-100	11-13	b, c
1996/97	110-125	90-105	13	b, c
1997/98	85-105	70-85	10	b, c
1998/99	100-125	70-85	11	b, c
1999/2000	100-115	75-85	14	b, c

<sup>a</sup> Fall estimate = pretrapping season population.

<sup>b</sup> Fall estimates based on known spring pack sizes, mean birth rate of 5–6.5 pups/pack, a pup survival rate of 0.82 and fall sightings.

<sup>c</sup> Basis of spring estimate is from limited track surveys, incidental observations, reports from public, and sealing records.

Table 2 Unit 11 wolf harvest, 1994–99

Regulatory Year	Reported harvest							Estimated Harvest		Method of Take								Successful trappers/Hunters
	M	%	F	%	Unk	%	Total	Unreported	Illegal	Trap/ snare	%	Shot	%	L&S	%	Unk	%	
1994/95	17	(49)	18	(51)	0	(0)	35	2	3	32	(91)	3	(9)	0	(0)	0	(0)	12
1995/96	7	(64)	4	(36)	0	(0)	11	2	3	9	(82)	2	(18)	0	(0)	0	(0)	6
1996/97	8	(42)	11	(58)	0	(0)	19	2	3	17	(89)	2	(11)	0	(0)	0	(0)	7
1997/98	11	(44)	12	(48)	2	(8)	25	2	3	11	(100)	0	(0)	0	(0)	0	(0)	5
1998/99	16	(44)	16	(44)	4	(11)	36	2	3	35	(97)	1	(3)	0	(0)	0	(0)	8

Table 3 Unit 11 wolf harvest chronology by month, 1994-99

Regulatory Year	Harvest periods									<i>n</i>
	August	September	October	November	December	January	February	March	April	
1994/95	3	3	3	3	6	48	20	14	0	35
1995/96	0	9	0	9	27	27	27	0	0	11
1996/97	0	11	0	16	16	26	26	5	0	19
1997/98	0	0	0	20	8	28	36	8	0	25
1998/99	0	3	0	8	8	53	17	11	0	36

Table 4 Unit 11 wolf harvest percent by transport method, 1994-99

Regulatory year	Percent of Harvest								<i>n</i>
	Airplane	Dog sled skis/ Snowshoes	Boat	4-wheeler	Snowmachine	ORV	Highway Vehicle	Unknown	
1994/95	9	3	0	0	85	0	3	0	35
1995/96	0	0	0	0	91	0	9	0	11
1996/97	11	0	0	0	89	0	0	0	19
1997/98	4	4	0	0	88	0	4	0	25
1998/99	3	6	0	0	88	0	3	0	36

## LOCATION

**GAME MANAGEMENT UNIT:** 12 (9978 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Upper Tanana and White River drainages; includes the North Wrangell, Nutzotin, and Mentasta Mountains and the eastern Alaska Range

## BACKGROUND

Historically, the Unit 12 wolf population fluctuated dramatically in response to federal and state predator control programs, ungulate prey abundance, and harvest. During the 1940s wolves were abundant but numbers were reduced by a federal control program conducted between 1948 and 1960. Also, prior to 1960, local residents commonly killed wolf pups at dens which maintained wolf populations at low levels in the vicinity of human settlements. After 1960 the wolf population increased rapidly and remained high until the mid-1970s. About 1975 the wolf population declined substantially due to prey shortages (DV Grangaard, personal observation). Since 1975 the moose and wolf populations in Unit 12 remained at a low density equilibrium (Gasaway et al. 1992).

During most years since 1960, the Unit 12 wolf population has been lightly harvested. Rarely has annual harvest approached or exceeded sustainable rates. Few local trappers select for wolves as most trappers concentrate on marten and lynx. However, during years when marten and lynx pelt price are low and wolf prices are adequate, more trappers concentrate on catching wolves. Also, when land-and-shoot taking of wolves was legal, harvests were higher, especially in the southern portion of the unit.

Historically moose have been the most important subsistence species in Unit 12 (Haynes et al. 1984; Halpin 1987), but since the mid-1970s unitwide moose densities have been low. Throughout the 1980s local residents requested the Board of Game to conduct wolf control to benefit the depressed moose population. However, most of the unit's lands (about 65%) are included in either Wrangell-St Elias National Park and Preserve or the Tetlin National Wildlife Refuge. Federal policy on those lands did not include predator management programs. The department did conduct wolf control within the northwestern portion of Unit 12 between 1981 and 1983.

## MANAGEMENT DIRECTION

### MANAGEMENT GOALS

The Unit 12 wolf management goals follow the Wolf Conservation and Management Policy for Alaska, adopted by the Alaska Board of Game 30 October 1991 and revised 29 June 1993. Those goals are to:

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.



- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation and management of wolves, their prey and habitat in Alaska.

#### **MANAGEMENT OBJECTIVES**

- Provide opportunity to participate in hunting, trapping, and viewing wolves.
  - Monitor harvest through sealing records and trapper questionnaires.
  - Temporarily close wolf trapping if the unit population declines below 100 wolves.
- Monitor wolf numbers and population characteristics.
  - Estimate wolf pack sizes and number of packs in selected areas within Unit 12.
  - Cooperate with any ongoing wolf studies conducted by the US Fish and Wildlife in Tetlin National Wildlife Refuge.

In 1998, the moose population in Unit 12 was designated by the Board of Game to be important for high levels of human consumptive use under the intensive management law (AS 16.05.255[e]–[g]). This designation means that the board must consider intensive management if regulatory action to significantly reduce the Unit 12 moose harvest becomes necessary because the population is depleted or has reduced productivity. If wolf control becomes necessary in the future to comply with this law, Unit 12 population objectives will be changed.

### **METHODS**

#### **ESTIMATING WOLF POPULATION SIZE**

Since 1980 the late winter wolf population estimates were based upon sightings of wolves and wolf tracks observed during aerial surveys (Stephenson 1978; Gasaway et al. 1983). Trapper and pilot reports, and trapper questionnaire results were compiled and contributed to population estimates where complete aerial surveys were not flown. Estimates of wolf numbers were increased by 10% to account for lone wolves present but not found (Mech 1973). All wolf packs having territories which were wholly or partially in Unit 12 were included in the estimate.

Autumn wolf population estimates were calculated by adjusting the late winter estimate upward based on the number of wolves harvested prior to surveys. Each year many wolf packs observed in March and April were also observed during the previous autumn and early winter. Therefore, changes in pack size for those packs were known.

#### **DETERMINING WOLF POPULATION CHARACTERISTICS**

Wolf research was not conducted in Unit 12 during the report period.

## HARVEST MONITORING

Wolves taken in Alaska must be sealed by an ADF&G representative or an appointed fur sealer. During the sealing process, information is obtained on the date and specific location of take, sex, color of pelt, estimated size of the wolf pack, method of take, and access used. Harvest data were summarized by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000).

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

During RY96–RY98, the Unit 12 autumn wolf population remained relatively stable at 223–237 wolves (Table 1). Estimated wolf numbers during this report period were 22% higher compared to the previous report period:

During the past 10 years, Unit 12 wolf numbers have fluctuated primarily due to prey availability and harvest rates. Between 1988 and 1992 Unit 12 wolf numbers increased by an estimated 27%. Autumn pack size and number of packs increased, indicating improved recruitment and adult survival. The population declined in 1993 due to harvest (36% harvest rate) and remained relatively stable due to moderate harvest rates until 1995. Area trappers selected for wolves during this period because wolf pelt prices were high and marten and lynx prices were low. Between RY94 and RY97, harvest was below the sustainable rate ( $\leq 25\%$ ) due to low fur prices, and the wolf population increased.

The wolf population increase between 1988 and 1992 was also aided by an elevated prey base as tens of thousands of Nelchina and Mentasta caribou annually traveled through or wintered in Unit 12, and also this period coincided with a snowshoe hare population high. Large numbers of caribou have been available to Unit 12 wolves between October and April except during 1992, 1995, and 1996 when most of the caribou traveled through Unit 12 and wintered in Unit 20E or returned to Unit 13. The timing of Unit 12 wolf population growth closely corresponds to the range expansion of the Nelchina and Mentasta caribou herds into Unit 12 wintering areas.

The seasonal, high caribou density benefited the area's wolf population. However, the increase in wolf numbers occurred during the same period the unit's moose population stabilized following a growth period during most of the 1980s (Gardner 1995). Since large numbers of caribou are in portions of Unit 12 only during winter, the elevated wolf population necessarily depended upon moose and small mammals as their primary prey during the remainder of the year.

### MORTALITY

#### *Harvest*

#### Season and Bag Limit.

Units and Bag Limits	Resident Open Seasons	Nonresident Open Seasons
Unit 12		
<i>Regulatory year 1996</i>		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. A wolf may be shot same day airborne if caught in a trap or snare, or trapper is over 300 ft from airplane. (This regulation was changed by an initiative disallowing wolves to be shot the same day airborne unless the wolf was in a trap or snare.) No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr
<i>Regulatory year 1997</i>		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr
<i>Regulatory year 1998</i>		
HUNTING: 5 wolves. No wolf hunting same day airborne.	10 Aug–30 Apr	10 Aug–30 Apr
TRAPPING: No limit. No trapping with a steel trap or a snare smaller than 3/32 inch in diameter during April or October.	15 Oct–30 Apr	15 Oct–30 Apr

Board of Game Actions and Emergency Orders. In November 1996 Alaskan voters passed an initiative which prohibited same-day-airborne hunting of wolves, fox, lynx, and wolverine. This initiative became effective on 25 February 1997. An initiative to ban the use of snares to catch wolves failed in November 1998.

During the spring 1998 meeting, the board designated the Unit 12 moose population as important for high levels of human consumptive use under the Intensive Management Law (AS 16.05.255(e)–(g)). This designation means that the board must consider intensive management if regulatory action to significantly reduce moose harvest in Unit 12 becomes necessary because the population is depleted or has reduced productivity. Wolf control has been identified by the legislature as an important management tool consistent with the intent of the intensive management law.

Hunter/Trapper Harvest. RY96, RY97, and RY98 wolf harvests in Unit 12 were 35, 45, and 67 wolves, respectively (Table 2). The average harvest was 49 wolves ( $\bar{x}$  harvest rate = 22%, range = 16–28%). The harvest rate during RY96 and RY97 allowed the wolf population to increase. In RY98, harvest increased and preliminary population data collected during RY99 indicated the wolf population declined, especially along the Glenn Highway and in Gardiner Creek Flats.

During the past 10 years, the response of the Unit 12 wolf population to harvest by hunters and trappers was similar to that documented in other wolf populations. Numerically stable wolf populations throughout North America have sustained harvests of 20–40% (Keith 1983). Harvests of >40% generally result in declining wolf populations, and those populations harvested at <20% generally increase. Those effects of exploitation seem to be consistent across a broad range of reported wolf densities in Alaska, Canada, Michigan, and Minnesota.

During RY96–RY98 the primary method used to harvest wolves in Unit 12 were traps and snares ( $\bar{x}$  = 83%). Incidental harvest by moose and sheep hunters during August and September accounted for most of the remainder of the harvest. The loss of same-day-airborne hunting had little effect on wolf harvest in Unit 12. The average take during the last 6 years this method was legal was 3.8 wolves (7% of the harvest).

Harvest Chronology. Chronology of the Unit 12 wolf harvest during RY96–RY98 (Table 3) reflects a low incidental harvest of wolves (10.2%) during the August and September hunting seasons, 0% and 4% harvest during the snaring-only seasons in October and April, respectively, and the highest harvest (83.8%) between November and March when all harvest methods and means are allowed. The greatest harvest occurred in January and February.

Transport Methods. During RY96–RY98, most successful wolf trappers used snowmachines (81%) (Table 4). Between RY89 and RY93, 27% of successful trappers used airplanes for transportation. Since RY94 this transport method has declined to 7%. Because of the high costs associated with using an airplane for trapping, area trappers who use this transportation method only select for wolves if pelt prices are cost efficient. During years of low wolf pelt prices, little harvest is expected by trappers who use aircraft.

## **HABITAT**

### *Assessment*

Only 7000–8000 mi<sup>2</sup> of Unit 12 is considered normal wolf habitat. Wolves seldom use the remaining 2000–3000 mi<sup>2</sup> of glacial ice fields and high rocky terrain. Good wolf habitat is determined more by ungulate prey abundance than by vegetative characteristics. Using this

criterion, the better wolf habitat in Unit 12 is found along the foothills of the Wrangell, Mentasta, and Nutzotin Mountains and the eastern Alaska Range where either resident or migratory moose are available to wolves year-round. Even though mountainous areas support dense populations of Dall sheep, wolves apparently cannot thrive on sheep alone as a primary prey species (Sumanik 1987). The nonmigratory Chisana caribou herd has provided a reliable food source for wolves in eastern Unit 12, but currently is declining rapidly and only numbers about 350 animals. Caribou from the Mentasta, Nelchina, and Macomb herds also used portions of Unit 12 in recent years. It seems the use of Unit 12 during the winter by these herds, especially the Nelchina Herd, improved the productivity of the wolf population during the late 1980s and throughout the 1990s.

Approximately 30 years of wildfire suppression in Unit 12 resulted in less diverse and productive wildlife habitats than would have occurred under natural conditions. Human developments and disruption of wildlife habitat are largely restricted to the immediate vicinities of existing communities and have had a minor impact on wolves.

#### *Enhancement*

A large percentage of Unit 12 has been afforded limited suppression status for wildfires in the Fortymile Area Interagency Fire Management Plan. This includes nearly all of the Wrangell-St Elias National Park and Preserve and most of the Tetlin National Wildlife Refuge. Unfortunately, much of the limited suppression area is essentially unburnable due to sparse fuels, high fuel moistures, low temperatures, and lack of ignition through lightning. Much of the more fire-prone land is in state or private ownership and was afforded critical, full, or modified suppression status.

During June–September 1990 a wildfire burned approximately 97,000 acres of primarily decadent black spruce muskeg in the Tetlin Hills and the adjacent Tok River lowlands. This fire is expected to improve moose winter browse supplies continually for the next 15–20 years to the benefit of both moose and wolves. By 1994 moose densities in this area increased from 0.2 to 0.7 moose/mi<sup>2</sup> and supported at least 2 wolf packs numbering 6–11 wolves. As of RY99, the moose density in this area was 1.1 moose/mi<sup>2</sup>, and 3 different wolf packs numbering 7–13 wolves were observed using the area.

Habitat enhancement programs using mechanical crushing and different logging techniques are being planned to effect over 1000 acres in the Tok River valley, a prime wintering area for moose. These programs are expected to benefit many species of wildlife including wolves.

#### **NONREGULATORY MANAGEMENT PROBLEM/NEEDS**

In the foreseeable future the intensive management law will most likely be enacted in Unit 12 based on the current trend of the unit's moose population and harvest pressure (Gardner 2000). In an attempt to better predict the outcome of wolf control on the moose population in Unit 12, I modeled the current population status and trend data for moose and their predators using the modeling software PredPrey (McNay and DeLong 1998).

Past research found that predation by both wolves and bears was the primary factor maintaining the area moose populations at low densities (0.2–1.0 moose/mi<sup>2</sup>, Gasaway et al. 1992; US Fish

and Wildlife Service, unpublished data). The effects of wolves and bears vary between areas within Unit 12. In the Northway and Tetlin Flats, both calf mortality and predation rate studies indicated that wolves were the primary predator on calves and adult moose throughout the year. In comparison, along the Nutzotin Mountains calf recruitment to 5 months was substantially lower and was more indicative of grizzly bear predation.

Modeling exercises using actual moose composition and predator kill rate data indicated the Unit 12 moose population continues to be primarily limited by wolves, although grizzly bears are an important predator in portions of the unit. The model also predicts that under the present management scheme, the Unit 12 moose population will remain at low density for an extended period of time with little opportunity for increased harvest.

Assuming grizzly bear predation rates remain relatively constant during the next 5 years, the model predicts that the Unit 12 moose population would increase substantially if wolf numbers were reduced. The moose population will increase at 8–14% annually if the unit's wolf population is controlled at the 80% reduction level, which has been found to have caused moose and caribou population increases in other areas of Alaska and Yukon (Boertje et al. 1996). However, wolf control is not an option on federal lands, which constitute a majority of Unit 12. If wolf control is conducted only on state and private lands, the moose population will increase at about 6–9%.

Based on the response of the moose population affected by the combination of the 1990 Tok Wildfire and intense public hunting and trapping of wolves, it appears local moose population increases can occur in Unit 12 without government wolf control but with intensive habitat management. These moose population increases will be moderate and will be eventually limited by predation. However, the increases would be enough to satisfy the intensive management law as long as the number of moose hunters does not substantially increase. Because of land-ownership patterns in Unit 12, this will be the management direction taken during the next 5 years.

Management objectives for the next reporting period will be revised.

## **CONCLUSIONS AND RECOMMENDATIONS**

Comparing the estimated average wolf population size during RY96–RY98 to RY93–RY95, the Unit 12 wolf population increased by an estimated 22%. The increase probably resulted from increased survival and productivity associated with an increased prey base. Harvest rates averaged 22% during RY96–RY98. Annual harvest rates >25% precludes wolf population growth in Unit 12.

The Unit 12 moose population stabilized during the period of wolf population growth. Moose are the only ungulate prey available to much of the Unit 12 wolf population between late April and mid October. Prior to the arrival of the wintering Nelchina and Mentasta herds and the increase in the unit's wolf population, the moose population in Unit 12 was increasing at about 5% annually.

During the 1980s the Unit 12 wolf population was lightly harvested. During the 1990s the annual wolf harvest in Unit 12 varied and in some years was the primary limiting factor to the wolf population. Harvest rates were dependant on fur price, weather conditions, and wolf movement patterns in relationship to the road system.

Most of the area residents desire some type of intensive management to benefit Unit 12 moose. Area residents support management that incorporates a combination of area-specific wolf reduction programs conducted by the public and habitat enhancement programs conducted by the agencies. Modeling predicts this management regime could cause a low to moderate increase in the moose population. However this level of management is not expected to attain a high-density moose population.

The only quantifiable objective during this report period was to temporarily close wolf trapping if the unit population declines below 100 wolves. No closure was necessary because the population remained above 100. Other objectives were not quantifiable and, therefore, could not be evaluated. During the next report period, they will be defined as activities and management direction will be to:

#### **MANAGEMENT GOALS**

- Ensure the long-term conservation of wolves throughout their historic range in Alaska in relation to their prey and habitat.
- Provide for the broadest possible range of human uses and values of wolves and their prey populations that meet wildlife conservation principles and which reflect the public's interest.
- Increase public awareness and understanding of the uses, conservation and management of wolves, their prey and habitat in Alaska.

#### **MANAGEMENT OBJECTIVE**

- Temporarily close wolf trapping if the unit population declines below 100 wolves.

#### **MANAGEMENT ACTIVITIES**

- Monitor harvest through sealing records and trapper questionnaires.
- Estimate wolf pack sizes and number of packs in selected areas within Unit 12.
- Cooperate with any ongoing wolf studies conducted by the US Fish and Wildlife in Tetlin National Wildlife Refuge.

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**PREPARED BY:**  
Craig L Gardner  
 Wildlife Biologist III

**SUBMITTED BY:**  
Roy A Nowlin  
 Regional Management Assistant



**REVIEWED BY:**

Mark E McNay  
Wildlife Biologist III

Table 1 Unit 12 autumn<sup>a</sup> wolf population estimates, regulatory years 1988–1989 through 1998–1999

Regulatory year	Population estimate <sup>b</sup>	Number of packs	$\bar{x}$ pack size <sup>c</sup>	Basis of estimate
1988–1989	136	21	5.8	Spring survey, reports, observations, sealing records
1989–1990	172–188	27	6.0	Spring survey, reports, observations, sealing records
1990–1991	220–236	29	7.1	Spring survey, reports, observations, sealing records
1991–1992	198–239	29	6.8	Spring survey, reports, observations, sealing records
1992–1993	230–243	29	7.4	Spring survey, reports, observations, sealing records
1993–1994	180–216	29	6.2	Reports, observations, sealing records
1994–1995	159–183	29	5.4	Reports, observations, sealing records
1995–1996	183–206	29	6.1	Reports, observations, sealing records
1996–1997	217–229	28	7.2	Reports, observations, sealing records
1997–1998	211–236	29	6.9	Reports, observations, sealing records
1998–1999	231–243	31	6.9	Spring survey, reports, observations, sealing records

<sup>a</sup> Autumn estimate = pretrapping season population.

<sup>b</sup> Includes 10% estimated number of single wolves present.

<sup>c</sup> Calculated using mean population estimate  $\times$  0.9 divided by number of packs.

Table 2 Unit 12 wolf harvest, regulatory years 1988–1989 through 1998–1999

Regulatory year	Reported harvest						Method of take							Successful Trappers and hunters	Wolves/person
	M	(%)	F	(%)	Total <sup>a</sup>	% Autumn population <sup>b</sup>	Trap or snare	(%)	Shot	(%)	SDA <sup>c</sup>	(%)	Unk		
1988–1989	6	(40)	9	(60)	17	12	12	(75)	4	(25)			0	8	2.0
1989–1990	15	(83)	3	(17)	20	11	7	(89)	2	(11)			0	10	1.9
1990–1991	45	(63)	27	(37)	74	32	56	(77)	7	(10)	10	(14)	0	26	2.8
1991–1992	19	(59)	11	(41)	34	15	20	(63)	8	(25)	4	(13)	0	16	2.0
1992–1993	26	(52)	24	(48)	54	22	51	(98)	1	(2)			0	15	3.5
1993–1994	37	(57)	28	(43)	71	36	54	(78)	6	(9)	9	(13)	2	24	3.0
1994–1995	18	(58)	13	(42)	31	18	26	(84)	5	(16)	0	(0)	0	16	1.9
1995–1996	25	(69)	11	(31)	46	24	42	(91)	4	(9)	0	(0)	0	15	3.1
1996–1997	19	(63)	11	(37)	35	16	28	(80)	7	(20)	0	(0)	0	17	2.1
1997–1998	28	(67)	14	(33)	45	21	35	(81)	8	(19)	0	(0)	2	23	2.0
1998–1999	38	(58)	28	(42)	67	28	58	(87)	9	(13)	0	(0)	0	25	2.7

<sup>a</sup> Total harvest includes animals of undetermined sex.<sup>b</sup> Proportion of the estimated autumn population harvested by the end of the season in April. If a range estimate was given in Table 1 the proportion taken is given as the harvest divided by the mean estimate.<sup>c</sup> SDA; wolf harvest taken by hunters and trappers same day airborne.

Table 3 Unit 12 wolf harvest chronology by time period, regulatory years 1988–1989 through 1998–1999

Regulatory year	Harvest periods																		Unk	n		
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Dec	(%)	Jan	(%)	Feb	(%)	Mar	(%)	Apr	(%)			May	(%)
1988–1989	1	(6)	0	(0)	0	(0)	3	(19)	3	(19)	3	(19)	3	(19)	1	(6)	2	(13)	0	(0)	0	16
1989–1990	1	(5)	0	(0)	0	(0)	1	(5)	7	(37)	3	(16)	3	(16)	4	(21)	0	(0)	0	(0)	0	19
1990–1991	3	(4)	1	(1)	0	(0)	1	(1)	6	(8)	15	(21)	27	(37)	16	(22)	4	(5)	0	(0)	0	73
1991–1992	1	(3)	3	(10)	0	(0)	2	(7)	4	(13)	3	(10)	7	(23)	4	(13)	6	(20)	0	(0)	2	32
1992–1993	1	(2)	0	(0)	0	(0)	3	(6)	13	(25)	14	(27)	2	(4)	15	(29)	4	(8)	0	(0)	0	52
1993–1994	1	(2)	3	(4)	1	(2)	5	(7)	16	(24)	8	(12)	15	(22)	14	(21)	4	(6)	0	(0)	4	71
1994–1995	0	(0)	1	(3)	2	(6)	1	(3)	9	(29)	9	(29)	4	(13)	5	(16)	0	(0)	0	(0)	0	31
1995–1996	0	(0)	3	(7)	1	(2)	3	(7)	5	(12)	14	(33)	12	(29)	4	(10)	0	(0)	0	(0)	4	46
1996–1997	1	(3)	2	(6)	0	(0)	1	(3)	5	(15)	7	(21)	7	(21)	5	(15)	5	(15)	0	(0)	2	35
1997–1998	3	(7)	2	(4)	0	(0)	2	(4)	12	(27)	8	(18)	12	(27)	6	(13)	0	(0)	0	(0)	0	45
1998–1999	3	(4)	4	(6)	1	(1)	5	(7)	9	(13)	21	(31)	13	(19)	10	(15)	1	(1)	0	(0)	0	67

Table 4 Unit 12 wolf harvest by transport method, regulatory years 1988–1989 through 1998–1999

Regulatory year	Harvest by transport method														Unk	n
	Airplane	(%)	Dogsled, skis, or snowshoes	(%)	Boat	(%)	3- or 4-Wheeler	(%)	Snowmachine	(%)	ORV <sup>a</sup>	(%)	Highway vehicle	(%)		
1988–1989	1	(6)	0	(0)	0	(0)	0	(0)	13	(81)	0	(0)	2	(13)	0	16
1989–1990	5	(26)	0	(0)	0	(0)	0	(0)	13	(68)	1	(5)	0	(0)	0	19
1990–1991	14	(20)	4	(6)	0	(0)	1	(1)	48	(69)	0	(0)	3	(4)	3	73
1991–1992	6	(24)	0	(0)	0	(0)	0	(0)	19	(76)	0	(0)	0	(0)	7	32
1992–1993	14	(27)	0	(0)	0	(0)	0	(0)	38	(73)	0	(0)	0	(0)	0	52
1993–1994	27	(39)	3	(4)	0	(0)	1	(1)	30	(43)	0	(0)	8	(12)	2	71
1994–1995	2	(6)	0	(0)	0	(0)	0	(0)	27	(87)	0	(0)	2	(6)	0	31
1995–1996	4	(9)	0	(0)	0	(0)	0	(0)	38	(82)	0	(0)	0	(0)	0	46
1996–1997	2	(6)	2	(6)	0	(0)	0	(0)	29	(83)	0	(0)	2	(6)	0	35
1997–1998	4	(9)	3	(7)	1	(2)	0	(0)	33	(77)	0	(0)	2	(5)	2	45
1998–1999	3	(5)	6	(9)	0	(0)	2	(3)	54	(83)	0	(0)	0	(0)	2	67

<sup>a</sup> Other than snowmachine and 3- or 4-wheeler.



## **LOCATION**

**GAME MANAGEMENT UNIT:** 13 (22,857 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Nelchina and Upper Susitna Rivers

## **BACKGROUND**

Wolf numbers in Unit 13 were low from the late 1900s until the early 1930s, reflecting corresponding low prey densities (Skoog 1968). Wolf numbers increased after this period, and by the mid-1940s wolves were considered common (Ballard et al. 1987). As a result of predator control by the U.S. Fish and Wildlife Service (FWS) between 1948 and 1953, wolf numbers declined dramatically. Based on estimates in Rausch (1967), as few as 12 wolves may have remained in the unit in 1954. Following cessation of wolf control, wolf numbers increased rapidly. A population of 350 to 450 wolves was estimated in 1965, and fall population estimates in subsequent years exceeded 300 wolves through the 1970s (Ballard et al. 1987). During the early to mid 1980s, wolf estimates were lower, averaging 275 wolves during the fall then increased to a 370 wolf average during the mid 1990s.

Before statehood (i.e., 1959) wolves were harvested under FWS regulations that provided year-round seasons and no bag limits. Denning and aerial shooting were legal, and bounties were paid. Beginning with statehood in 1959, the wolf season was closed in Unit 13 for a 5-year period. In 1965, a short season was held. The late 1960s established seasons approximating current dates with no bag limits. In 1971 mandatory sealing was established and aerial shooting without a permit was prohibited (Harbo and Dean 1983). Harvest levels prior to mandatory sealing are unknown. Between 1971 and 1991, an average of 91 (range = 32–145) wolves per year were sealed in Unit 13.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT GOALS**

Determine wolf population estimates yearly. Regulate wolf harvests yearly to prevent overharvesting yet maintain adequate harvests to assure that management objectives for wolves in Unit 13 are met.

### **MANAGEMENT OBJECTIVES**

To achieve and maintain a posthunting and trapping season population of 135 to 165 wolves (3–4 wolves/1000 km<sup>2</sup>) distributed proportionally among subunits.

## **METHODS**

We conducted aerial track surveys to estimate the wolf population in Unit 13 during late fall and again in late winter. Biologists flew surveys in a systematic manner in an attempt to locate wolf tracks, then followed tracks to determine the size and color composition of the pack. Additional information on wolf numbers and distribution was collected by trapper surveys and incidental sightings by department personnel and the public. This information was combined with survey

data to extrapolate a unit population estimate. We monitored harvest by requiring sealing of all wolves taken in the unit.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Size*

The spring 1999 wolf population estimate was 300 (7.0 wolves/1000 km<sup>2</sup>) wolves (Table 1) and is the highest spring population estimate reported in GMU 13 in over 25 years. Spring population estimates have increased the last 5 years. Fall population estimates for 1998 and 1999 approached 500 (12.0 wolves/1000 km<sup>2</sup>) wolves unitwide and are the highest ever reported. Fall wolf estimates between 1993 and 1997 averaged 370 wolves; the average between 1991 and 1992 was only 330 wolves.

Current wolf population estimates place the overall GMU 13 wolf density at approximately 12 wolves/1000km<sup>2</sup>. Some portions of the unit, such as 13D, are lower than this, and, in other areas, like portions of 13A and 13E probably support wolf densities around 15–18 wolves/1000km<sup>2</sup>. Historically other portions of Alaska have supported wolf densities as high as 20 wolves/1000km<sup>2</sup> (Ballard et al. 1987). Modeling (Predprey ADF&G) indicates that until prey populations decline even further, wolf numbers will remain high and stable. Wolf abundance could also increase in some portions of the unit, depending upon locally available prey. Low densities of prey in 13D probably will not support higher numbers of wolves than currently exist. Harvest rates of wolves at present are sustainable and are not high enough to affect declines in overall wolf abundance.

#### *Population Composition*

Sex composition data for wolves in Unit 13 are not available. Age composition data are inferred by comparing fall population estimates to the previous spring. The fact that fall estimates are appreciably higher than spring estimates indicate pup production and survival is high in Unit 13. Pup production the last two years has been especially high, possibly because of a snowshoe hare cycle high. Hares provide an additional source of food during the critical whelping period and allow for higher pup survival.

#### *Distribution and Movements*

Distribution and movement patterns of wolves in Unit 13 are dependent on prey availability (Ballard et al. 1987). In Unit 13 wolf territory, size and productivity are primarily functions of moose densities. Locations of radiocollared wolves indicate wolves do not follow caribou that are migrating out of a wolf pack territory. As in other areas in Alaska, a certain percentage of Unit 13 wolves are observed as singles and may be dispersing. Immigration into Unit 13 is relatively common as radio collared wolves from the Kenai Peninsula, Denali National Park, and Units 20 and 12 have been observed or harvested in Unit 13.

## MORTALITY

### *Harvest*

Season and Bag Limit. Wolves are harvested under hunting and trapping regulations. Wolf trapping season runs from 15 October until 30 April. However, steel traps or snares smaller than 3/32-inch diameter may be used only between 10 November and 31 March. Wolf hunting season runs from 10 August to 30 April with a bag limit of 10 wolves per day. Between 1994 and February 1997, trappers could shoot wolves the same day airborne if they were 300 feet from the aircraft. Since February 1997, taking wolves the same day airborne has been prohibited.

Board of Game Actions and Emergency Orders. The board designated Unit 13 an intensive management area in 1995. Increased human harvest of moose and caribou became the primary objective for the unit. As a result, the Board reduced the wolf population management objective to between 135 and 165 wolves postharvest in the spring. Methods and means for wolf hunting and trapping remained unchanged until a statewide vote on Proposition 3 in the November 1996 general election passed. This proposition eliminated the taking of wolves the same-day-airborne as of 25 February 1997. During the March 1999 Board of Game meeting, the bag limit for wolf hunters in Unit 13 was increased to 10 wolves per day. The Board of Game, in March 2000, passed a wolf predation control implementation plan for Units 13A, B, and E east of the Alaska railroad except for federal lands. The management objective for a post control wolf population was 25 wolves in both 13A and B and 50 wolves in 13E. At this meeting, the Board also liberalized use of snowmachines for taking wolves.

Hunter/Trapper Harvest. Hunters and trappers harvested 176 wolves in Unit 13 during the 1998–99 season (Table 2). Wolf harvests have fluctuated during this reporting period from a 1995 low of 122 wolves to the current high of 176. The largest wolf harvest reported in Unit 13 in over 25 years was 179 wolves taken in 1993. A definite increase in the GMU 13 wolf harvest is evident when the 5 year average take of 148 wolves sealed during this reporting period is compared to the average harvest of 81 wolves a year during the 10 years from 1980 to 1989. Harvest composition data indicate a slight overall predominance (55%) of males in the harvest, but this is variable yearly (Table 2).

Trapping and snaring accounted for only 37% of the take in 1991–92 when same-day-airborne permit hunting was legal. Snaring and trapping have become the most successful methods of taking wolves since land-and-shoot permit hunts ended; snaring and trapping accounted for 80% of the 1998–99 harvest. Before this reporting period, ground trappers did not generally take as many wolves as land-and-shoot hunters.

Permit Hunts. The last permit wolf hunt in Unit 13 was a land and shoot registration hunt held between 1991 and 1993.

Hunter/Trapper Residency and Success. During the 1998–99 season, 58 hunters and trappers harvested an average of 3.0 wolves in Unit 13; the average take per trapper during the previous 4 years (1994–98) was 2.4 wolves per year. The average take per trapper has increased slightly from the 2.1 wolf average observed during the 1980s. In 1998–99, 5 nonresidents took 6 wolves, 18 local residents killed 80 wolves, and 35 nonlocal Alaska residents took 90 wolves.



Harvest Chronology. Harvest chronology varies somewhat during the last 5 years (Table 3). In 1997 and 1998, February had the highest reported wolf harvest. During the prior 3 years, December and January had higher reported harvests. The change in harvest chronology between years probably reflects yearly changes in snowfall which influences access and trapping conditions.

Transport Methods. When same-day-airborne hunting was legal (before 1992–93), successful hunters and trappers preferred using aircraft. Historically, more wolves were taken with the use of aircraft, reflecting the remote nature of the unit and the importance of same-day-airborne harvesting. In recent years use of snowmachines has surpassed using aircraft as the most important method of transportation (Table 4). This change occurred not only because it became illegal to take wolves same-day-airborne but because of improvements in snowmachines themselves. A few years ago drastic improvements occurred in snowmachine design and manufacturing. Modern snowmachines are more powerful, faster, travel better in deep snow, and are more comfortable to ride and much more mechanically reliable. As a result, trappers and hunters are able to penetrate further into remote portions of the unit. Aircraft use did increase in 1998-99 but this increase was attributed to a few individuals who were very successful snaring wolves by finding kills from the air and setting snares at the kill sites. The area they trapped was very remote and accessible only by air.

#### *Other Mortality*

Ballard et al. (1987) determined natural mortality rates for radio collared wolves in a portion of Unit 13. They attributed 11% of annual mortality to intraspecific strife and 9% to accidents, injuries, starvation, and drowning. Ballard attributed the remaining 80% to legal and illegal human harvest. Since completion of this study, taking of wolves by land-and-shoot has become illegal. By observing kill sites, we can determine illegal use of airplanes to take wolves. Field observations in recent years indicate the illegal wolf harvest in Unit 13 is not large and does not affect population levels.

#### **NONREGULATORY MANAGEMENT PROBLEMS/NEEDS**

During the spring 2000 session, the Legislature passed a bill allowing same-day-airborne hunting of wolves by the public in those units having wolf predation control areas established by the Board of Game. This is an open hunt and, unlike the last same-day-airborne hunt, permits are not required. Reduced control over wolf harvest will make achieving subunit population objectives, as directed by the Board, more difficult. This type of hunt increases the need for better population estimates on a subunit basis.

The possible introduction of the biting dog louse into the Unit 13 wolf population is another serious problem. A female yearling was trapped along the Copper River during January 2000 that had been tagged in 1999 while being treated for lice in Unit 14. Although this wolf demonstrated clinical evidence of louse infection, individual lice were not observed. The outlook for preventing the spread of lice into Unit 13 is poor based on the high infection rate of wolves in Units 14 and 15 coupled with the observed dispersal of wolves from these units into Unit 13.

## CONCLUSIONS AND RECOMMENDATIONS

Wolf numbers in Unit 13 increased during this reporting period. The spring population estimate increased to 300 wolves, the highest estimate in over 25 years. The current population estimates exceed the management objectives for wolves set by the Board of Game in 1995. Modeling of wolf population trends suggests that wolf numbers can be maintained and possibly increase during the next few years in all units except 13D where prey densities are lower. The observed density of wolves in Unit 13, although already very high, is still below densities observed in other portions of the state where prey is abundant and wolves are unregulated. Wolf numbers are expected to remain stable until the prey populations decline to low levels, then wolf numbers will also decline. Without some form of predator management, both prey and wolf numbers will decline and remain at a low level for a long period.

Wolf harvests increased during this reporting period. Yearly fluctuations in wolf harvests reflect trapping effort and weather conditions more than wolf abundance. Trapping effort reflects both trapping conditions and economic factors. Trappers must have sufficient snow to travel by snowmachine or to land ski planes, as well as make sets. Economic factors include the price paid for furbearers and their abundance. During the early to mid 1990's, fur prices were low on most of the common Unit 13 furbearer species, except marten and wolves. Prices on wolves peaked between 1993 and 1995 and contributed to the high harvests. Weather conditions and snow depths were favorable to wolf trapping those years. By 1995-96 wolf prices began to decline and snowfall was the lowest in over 7 years, restricting trapping activity. The demand and the price paid for wolves have continued to decline in recent years. Currently there is good market value for only the best quality adults; pups and average-quality adults are much less marketable. If the dog louse infects wolves in Unit 13, as it has in Units 7, 14, and 15, wolf pelts will be worthless and trappers will quit taking wolves. The volatile fur market will continue to affect demand and prices for wolves.

The current wolf harvest appears to be insufficient to reduce the wolf population to meet wolf management objectives for intensive management. Harvests observed during 1990-95 were reducing wolves, and the spring population was approaching management objectives. Based on the effect these high harvests have had on wolf numbers, the potential existed for human harvests to control wolf numbers if some form of same-day-aircraft use was allowed. Since eliminating the same day use of aircraft, trappers have not been able to take enough wolves to limit population growth or reduce wolf numbers. Although ground trappers are taking more wolves and becoming more efficient, they have not been able to take enough wolves every year to limit population growth. Annual harvest rates would have to reach 35% or more of the fall population to cause a decline in wolf numbers.

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**PREPARED BY:**

Robert W. Tobey  
Wildlife Biologist

**SUBMITTED BY:**

Michael G. McDonald  
Assistant Management Coordinator

Table 1 Unit 13 fall and spring wolf population estimates<sup>a</sup>, 1994–2000

Year	Population estimate		Packs (nr)	Basis of estimate
	Fall	Spring		
1994/95	325-375	180 (160-200)	40	b
1995/96	310-350	220 (200-240)	40	b
1996/97	375-425	240 (220-260)	45	b
1997/98	360-400	260 (240-280)	50	b
1998/99	475-525	300 (280-320)	55	b
1999/2000	490-540	--- ---	60	b

<sup>a</sup> Fall estimate = pretrapping season population; spring estimate = posttrapping season population.

<sup>b</sup> Basis of estimate, aerial track surveys, incidental observations, reports from public, sealing records.

Table 2 Unit 13 wolf harvest, 1994–1999

Reported harvest								Estimated Harvest		Method of Take										Successful trappers/ Hunters
										Trap										
Year	M	%	F	%	Unk	%	Total	Unreported	Illegal	snare	%	Shot	%	SDA	%	Unk	%			
1994/95	85	(56)	55	(43)	2	(1)	142	5	5	80	(52)	73	(43)	0	(0)	0	(0)	74		
1995/96	64	(52)	57	(47)	1	(1)	122	5	5	91	(74)	30	(25)	0	(0)	1	(1)	58		
1996/97	80	(57)	61	(43)	0	(0)	141	5	5	109	(77)	32	(23)	0	(0)	0	(0)	60		
1997/98	73	(49)	75	(50)	1	(1)	149	5	5	126	(84)	22	(15)	0	(0)	1	(1)	50		
1998/99	84	(48)	86	(49)	6	(3)	176	5	5	142	(80)	34	(20)	0	(0)	0	(0)	62		

# Alaska's Game Management Units

